

A
DICTIONARY
OF
THE ECONOMIC PRODUCTS OF INDIA.

BY
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REPORTER ON ECONOMIC PRODUCTS TO THE GOVERNMENT OF INDIA.
(ASSISTED BY NUMEROUS CONTRIBUTORS)

IN SIX VOLUMES

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EFACE

THE following are the circumstances which led to the publication of the Dictionary of Economic Products. In 1877, the Agricultural Department of the North Western Provinces was required to provide a collection of products for the Paris Exhibition, and again, in 1880, for the Melbourne Exhibition. Early in 1883, the Imperial Department of Agriculture was called upon for a third collection for the Exhibition at Amsterdam. Requisitions were at the same time received from the Governments of Italy and Belgium for sample collections of commercial products. The collections above referred to were all made, under the direction of the undersigned, by Babu Trailokhya Nath Mukharji, now the Assistant Curator of the Economic Section of the Indian Museum, and their formation led to the gradual compilation of a list of the more important Economic Products of India, which was illustrated by a series of samples or specimens arranged in glass fronted tin cases designated the "Index collection." But the list was far from being complete, and was necessarily wanting in scientific detail and arrangement. Matters stood thus when a request was made to the Imperial Government by the Government of Bengal for assistance and co-operation in providing a collection of Economic Products for the Calcutta Exhibition of 1883-84. The opportunity was taken to obtain from the Government of Bengal, for the purpose of securing the scientific arrangement of the collection, the services of Dr. George Watt, of the Bengal Educational Department, who had been originally sent out to India as Professor of Botany, and who had already done useful work in the field of

botanical research The Bengal Government had, at the same time, formed the intention of bringing into scientific order a valuable collection of Bengal products at the Provincial Economic Museum in Calcutta

Dr Watt, with the assistance of Babu Trailokhya Nath Mukharji, devoted himself, during 1883, to the combined duty which he was called upon to perform, of enlarging and arranging both the Imperial and Provincial lists and collections The results were exhibited in the Economic Court at the Calcutta Exhibition, and formed a great stride in advance of all that had been previously done The time, however (less than a year), allowed for the preparation of the Calcutta collection was too short for a full compilation of the facts and statistics which were necessary for the proper investigation and description of each product Nor was the index collection itself sufficiently full These circumstances, as well as the likelihood of having to provide a collection for the London Exhibition of 1886, led to the retention of Dr Watt's services by the Imperial Department for the purpose of preparing as complete a "Dictionary of Economic Products" as might be possible, with the information already existing in the Agricultural Office, Babu Trailokhya Nath Mukharji being at the same time entrusted with the duty of enlarging the "Index collection" of specimens

It is needless to explain that the work upon which Dr Watt has been thus engaged is one which it would have been in any case necessary for the Agricultural Department to carry out independently of any call which was made upon it in connection with Exhibitions At the same time the utility of Exhibitions in forwarding the performance of the duty should not escape notice Now that the work has reached the stage of a compilation of existing facts and statistics up to date, it will become the further duty of the Department to make, with the assistance of the Agricultural Departments of the Provinces, such investigations as may be necessary for obtaining the fuller information,

which is still wanting, about many of the Economic Products of the country, as well as to maintain and publish periodical statistics of the production of or the traffic in the more important articles. It will become a question for consideration whether a second and more complete edition of the present work should not be published by the Department when sufficient material has been collected, and the present opportunity is taken to invite all who may be interested in the matter to contribute any information which may serve to correct or supplement the contents of the first edition.

E C BUCK,

Secretary to the Government of India,

Department of Revenue and Agriculture

January 1st 1889



PREFACE

THE circumstances which led to the publication of the present work having been indicated by Sir Edward Buck, it may not be deemed out of place for me to offer a few words of explanation regarding the manner in which I have endeavoured to accomplish the task committed to me. The present edition professes to be an approximately complete *résumé* of the opinions of Indian authors, and of extensive official and private enquiries, regarding the Economic Products of India. Care has been taken to show the sources from which the more important facts have been obtained, and to give, in most cases, the entire list of works consulted in the preparation of the account of each product. I have chosen to adopt this course, even in dealing with facts so well known that they might legitimately have been published without acknowledgment. It is hoped that on this account the "Dictionary of the Economic Products of India" will be found a useful work of reference, and that it may form the nucleus of an extended and systematic enquiry into the productive resources of the Indian Empire. The limited time at my disposal has almost precluded original and personal investigation of critical questions, and therefore, except in so far as ten years of botanical research in India have supplied me with the means of rapidly correcting misunderstandings, the opinions of authors, even when apparently conflicting, have been placed side by side. One of the objects I have kept in view has been to remove the confusion and ambiguity due to wrong or antiquated botanical names being associated with economic products. If I have succeeded, an important step will have been taken in the right direction, and the Dictionary, though not a strictly scientific publication, will, I trust, be found sufficiently accurate in its scientific details for all practical and commercial purposes.

I have had to keep in view a twofold purpose, *viz.*, on the one hand, to supply scientific information which may be useful to the administrative officer, and on the other, to meet the requirements of the reader in search of definite information regarding Indian economics. It may perhaps convey a not inadequate idea of the scope of the Dictionary to say that with this double purpose in view it is hoped that something may have been done to advance the material interests of India, and to bring the trade and capital of the West into more direct contact with the resources of the Empire.

With regard to botany, Sir J D Hooker's *Flora of British India* has been taken as the standard of scientific names and synonyms, and the reference to that invaluable work will be found in the first line following the name of each species. The botanic diagnosis of the plants from Ranunculaceæ to Acanthaceæ has been entirely derived from the *Flora of British India*. For the plants which fall into the natural orders after Acanthaceæ, a larger number of authors have had to be consulted, the scientific names used in this portion have been derived chiefly from Bentham and Hooker's *Genera Plantarum*, DeCandolle's *Prodromus*, Roxburgh's *Flora of British India*, The Linnæan Society's publications, Brandis's *Forest Flora*, Kurz's *Forest Flora of British Burma*, Thwaites' *Enum Ceylon Plants*, Dalzell and Gibson's *Bombay Flora*, Stewart's *Panjab Plants*, and Mr Gamble's recent and most useful *Manual of Indian Timbers*. Until the authors of the *Flora of British India*, who are associated with Sir J D Hooker, have completed their account of the plants of India, it will be next to impossible for Indian authors to obviate a repetition of some of the errors of the older botanical writers. This is chiefly due to the fact that the libraries and collections available in India are too poor to admit of much literary and critical botanical research, moreover, work of this nature was not contemplated in connection with the present edition of the Dictionary.

A list of the principal authors from whom economic facts have been compiled will be found on page xiii. The economic products which belong to the Animal and Mineral Kingdoms have been but very imperfectly touched upon. It is hoped that these products may, however, receive more attention in a future edition, and the reader is, for the present, referred to the publications of the Geological Survey for detailed information about the Ores and Minerals of India. The majority of the brief notices regarding minerals which are here published, have, at the request of the Revenue and Agricultural Department, been kindly supplied by the Superintendent of the Geological Survey.

It may be explained that, with the permission of the Government of India, some 300 copies of each of my "Catalogues of the Economic Products of India" (Calcutta International Exhibition) were issued to officers of all Departments throughout India for additions and corrections. Of these a considerable number have been duly returned, and the Dictionary, incorporating as it does the new economic facts which have come to light through this combined enquiry, may be viewed as an improved and enlarged edition of the Catalogues. I have endeavoured to give as much prominence as possible to the information thus obtained, and the notes supplied will accordingly be found under each article following the symbol § and bearing an abbreviation of the name and address of each contributor.

A full list of all contributors will be found on page xxiii, but I must here express the very great obligation I am under to them all, and severally, for the liberal and invaluable aid they have given me

With regard to the spelling of vernacular names, it may be stated that it has been thought unwise to depart from the method adopted by the authors from whom this work has been chiefly compiled. To correct the names given to the same object in the numerous languages and dialects of India would of necessity require the co operation of many persons acquainted with these languages. At the same time the economic plants known to local authorities under certain vernacular names would have to be botanically determined. As this could not be accomplished in the limited time at my disposal, an effort has been made to indicate the long vowels by a diacritic mark, and it is hoped this will enable the reader to pronounce the majority of the vernacular names correctly. In a future edition greater care will doubtless be observed and the vernacular names will be revised and confirmed.

It may be explained that the vernacular names are given with reference to their provincial distribution rather than with regard to the language to which they actually belong, thus BENG may mean simply that the word is in use in Bengal but need not be Bengali.

The alphabetical arrangement of the Dictionary is based upon the scientific names of the animals, plants, and minerals. This has been accepted as at once the most convenient and satisfactory standard, since it secures uniformity. With regard to large commercial products obtained from more than one species, such as silk, the subject has been treated collectively, instead of being broken up into a number of sections under the scientific names of the insects which yield the various kinds of silk. This should cause no difficulty however, as the numerous cross references will serve to direct attention to the heading under which the detailed accounts are to be found.

On the margin a number for each product or object has been given. It is hoped that these numbers may not only prove useful for museum purposes, but that they may also afford a convenient clue for correspondence regarding the products. To avoid using an inconveniently large number of figures, the numbers for each letter of the alphabet will be found to commence anew. The index will contain all the European and Vernacular names. It will give the corresponding scientific name and will enumerate the known and described products, referring the reader to the marginal number for each, thus—Gum, A 756, or Fibre, B 399. It is hoped that in this way the index may even prove useful as an independent work upon the names given to the Economic Products, it will contain over 30,000 vernacular words.

I desire to acknowledge in this place the invaluable services of the following gentlemen Sir J D Hooker, late Director, Royal Gardens, Kew, for kindly permitting me to consult him upon difficult botanical points, Professor W T Thiselton Dyer, Director, Kew, for many valuable additions and corrections, Dr George King, Superintendent, Royal Botanic Gardens, Calcutta, for the liberty to utilise freely the resources of the Herbarium and Library attached to the Gardens, Mr C B Clarke, Inspector of Schools, Calcutta, for identifying doubtful plants, and Mr J F Duthie, Superintendent, Botanic Gardens, Saharanpur, for notes and suggestions, Dr H Trimen, Director of the Botanic Gardens, Ceylon, for many important additions, more particularly with reference to Ceylon Botany I am also specially indebted to Mr E T Atkinson, Accountant General, Bengal, for many valuable additions to the proof-sheets of this work, and for having placed at my disposal manuscripts containing many interesting notes and original observations I am likewise greatly indebted to the officers in charge of the Provincial Agricultural Departments, both for much personal assistance and for the prompt manner in which they have uniformly responded to my solicitations for the aid of local specialists

To Dr Charles Rice of New York, Dr W Dymock of Bombay, and Dr Moodeen Sheriff of Madras, my best thanks are due for kindly consenting to revise the proofs of the present edition with the view of correcting the vernacular names and of adding to the information I may be pardoned for quoting a passage from a private letter from Dr Moodeen Sheriff as showing the liberal way in which he has co-operated with me "In revising the vernacular names I am not solely depending upon my '*Supplement to the Pharmacopœia of India*,' but am consulting many other works and making fresh enquiries This together with my experience, which is much greater than before, will, I hope, enable me to accomplish satisfactorily the work entrusted to me" I deeply regret the death of Dr U C Dutt, of Serampore, the able author of "*The Materia Medica of the Hindus*" which has deprived me, in the greater portion of the work, of the assistance which he was so eminently qualified to render Dr Dutt undertook to supply a series of notes regarding the plants enumerated in the Glossary to his *Materia Medica*, and to revise the Sanskrit names in the bulk of the work The latter duty has been generously undertaken by Dr Rice, and as the result I have received from New York many valuable additions and corrections which cannot fail to prove valuable to students of Oriental literature These distinguished scholars are not, however, in any way responsible for the accuracy of the vernacular names throughout the work, since many additions have been made subsequent to their kind supervision

My acknowledgments are specially due to Dr Cuningham, late Surgeon-General with the Government of India, for having encouraged the numerous medical officers throughout India to supply the series of notes which constitute a most important feature of the work

The trade statistics have been furnished by Mr J E O'Connor, Assistant Secretary, Department of Finance and Commerce, Government of India In supplying these figures Mr O'Connor has rendered me a most important service, at the same time he has obligingly offered many other suggestions and corrections

Further, I would acknowledge the great personal interest taken in the work by Mr E J Dean, Superintendent of Government Printing, India Working with the staff of printers who have but an imperfect knowledge of the English language, Mr Dean has shown, as I believe will be readily admitted, that he can produce an elaborate work of this nature in a manner worthy of a high class European press

GEORGE WATT

CALCUTTA,
January 1st, 1889

LIST OF WORKS CONSULTED

The following is a list of the more important works journals reports, or other publications which have been either directly or indirectly consulted in the preparation of the Dictionary of the Economic Products of India As far as possible the rule has been followed of quoting original authors and an effort has been made to show the source from which every statement has been derived It is hoped that this fact may be accepted as a decided advantage but it has somewhat encumbered the work with references

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LIST OF ABBREVIATIONS

Authors names are abbreviated and printed in *italics* after the name given by them to an animal or plant. This is necessary since the same object may have come to receive more than one name and may even have been referred to two distinct genera—a result either due to ignorance of what had already been published or in consequence of a difference of opinion regarding the nature of the species. The ambiguity thus caused through the existence of more than one name for the same object or through the application of the same name to two distinct objects is mitigated by affixing the author's name in full if this be composed of only one syllable or (when of more than one syllable) some convenient abbreviation to represent the author's name. The abbreviation once adopted by one author is never assumed by a second author who may chance to bear the same so that *Wall* is accepted by all botanists in the world to stand for Dr Wallich one of the most distinguished of Indian botanists.

The multiplicity of synonyms for the same object is one of the most perplexing evils—and an unavoidable evil—which besets systematic science. The changing of names is not however, the result of fancy but is a necessary consequence of improved knowledge and extended acquaintance with the forms of life. The difficulty of synonymy experienced by Indian students is scarcely felt in Europe where the names given to the animals and plants are thoroughly established. This explanation is offered because of the very general complaint against the changes which have within the past few years been made in the names given to Indian animals and plants. It should be recollected that the natural history of an empire like that of India cannot be worked out in a century and that any attempt to systematise the scattered publications which have appeared from time to time must result in the suppression of names which have come in correctly into existence. The following list gives the principal abbreviations adopted for authors names —

Abbreviations of Names of Botanists and Botanical Authors

| | | | |
|------------------|--|--------------------|---|
| <i>Ach</i> — | Acharius | <i>Arn</i> — | Arnott |
| <i>Adans</i> | Adanson | <i>Arrh</i> | Arrhenius |
| <i>Afs</i> | Afzelius | <i>Asa Gray</i> | Asa Gray |
| <i>Ag</i> | Agardh | <i>Asch</i> | Ascherson |
| <i>C Ag</i> | C A Agardh | <i>Asiat Reser</i> | Asiatic Researches |
| <i>J Ag</i> | { J G Agardh son | <i>Aubl</i> | Aublet |
| <i>Ag f</i> | | | |
| <i>Ait</i> | Aiton | <i>B Cab</i> | Botanical Cabinet |
| <i>Aitch</i> | Aitchison | <i>B Mag</i> | Botanical Magazine |
| <i>All</i> | Allioni | <i>B Misc</i> | Botanical Miscellany |
| <i>Amm</i> | Amman | <i>B Reg</i> | Botanical Register |
| <i>Anders</i> | Andersson of Stockholm | <i>Bab</i> | Babington |
| <i>Anders</i> | Anderson | <i>Bail</i> | Baillon |
| <i>Andr</i> | Andrews | <i>Baker</i> | Baker |
| <i>Andr B Re</i> | The Botanists Repository by Henry Andrews | <i>Balb</i> | Balbis |
| <i>pos</i> | | <i>Balbis</i> | Balbis (John Baptist) a French Professor of Botany |
| <i>Andrs</i> | Andrzejowski | <i>Baldw</i> | Baldwin |
| <i>Ann mus</i> | Annales du Museum d His toire Naturelle | <i>Balf</i> | Balfour |
| <i>Aresck</i> | Areschoug | <i>Banks Herb</i> | Banksian Herbarium |

| | | | | |
|------------------------|---|--|---------------------------|---|
| <i>Barn</i> | — | Barnéoud. | <i>Br</i> or <i>R Br</i> | Robert Brown. |
| <i>Barr</i> | | Barrelier | <i>Br</i> or <i>NE Br</i> | N E Brown. |
| <i>Bart</i> | | Benj Smith Barton | <i>P Br</i> | Patrick Browne |
| <i>W Bart</i> | | W P C Barton nephew | <i>Brunf</i> | Brunfels |
| <i>Bartl</i> | | Bartling (Th Fr) Ord Nat Plantarum | <i>Ham.</i> | Buchanan Hamilton |
| <i>Bartv</i> | | John Bartram | <i>Buch.</i> | Dr F Hamilton (former Buchanan) |
| <i>Bartv f</i> | | Wm Bartram | <i>Buch Herb</i> | Buchanan's Herbarium |
| <i>Bauh</i> | | Bauhin | <i>Buch MSS</i> | Buchanan's Manuscripts |
| <i>J. Bauh</i> | | Bauhin (Johannes) | <i>Buckl</i> | Buckley |
| <i>Beauv</i> | | Palisot de Beauvois | <i>Bull</i> | Bulhard. |
| <i>Bedd</i> | | Beddome | <i>Burch</i> | Burchell (Wm) a South African traveller and botanist |
| <i>Benj</i> | | Benjamin | <i>Burm</i> | Burman |
| <i>Benn</i> | | J J Bennett | <i>Burm Afric</i> | Burmans (Johannes) African Plants |
| <i>A Benn</i> | | A W Bennett | <i>Burm Zeyl</i> | Thesaurus Zeylanicus by J Burmann |
| <i>Benth or Bth</i> | | Bentham | <i>Burm Ind</i> | Flora Indica by N L Burmann |
| <i>Berg</i> | | Bergius | <i>Buxb</i> | Buxbaum |
| <i>Berk</i> | | M J Berkeley | <i>Cam</i> | Camerarius |
| <i>Berkl</i> | | Berkhey | <i>Camb</i> | } Cambessedes |
| <i>Berken</i> | | Berkenhout | <i>Cambes</i> | |
| <i>Berland</i> | | Berlandier | <i>Campd</i> | Campdera |
| <i>Bernh</i> | | Bernhardi a German botanist | <i>Cand</i> | De Candolle usually DC |
| <i>Bert</i> | | Bertero | <i>Casp</i> | Caspary |
| <i>Bertol</i> | | Bertoloni | <i>Cass</i> | Cassini |
| <i>Bess</i> | | Besser | <i>Catesb</i> | Catesby |
| <i>Bieb</i> | | Marschall von Bieberstein | <i>Cav</i> | Cavanilles |
| <i>Bigel</i> | | Jacob Bigelow | <i>Cerv</i> | Cervantes |
| <i>Bisch</i> | | Bischoff | <i>Cham</i> | Chamisso |
| <i>Bivon</i> | | Bivona (a Sicilian botanist) | <i>Chapm</i> | A W Chapman |
| <i>Bl or Blume</i> | | Blume | <i>Chav</i> | Chavannes |
| <i>Bl Bujdr</i> | | Blume (C L) Bijdragen tot de flora von Nederlandsche Indie | <i>Choisy</i> | Choisy |
| <i>Bl Cat</i> | | Blume's Catalogue | <i>Clarke or C B C</i> | C B Clarke |
| <i>Bahm</i> | | Böehmer | <i>Clayt</i> | Clayton |
| <i>Boerh</i> | | Boerhaave | <i>Clus</i> | Clusius |
| <i>Boiss</i> | | Boissier | <i>Colebr</i> | Colebrooke (H T) a well known English writer on Indian plants |
| <i>Boland</i> | | Bolander | <i>Collad</i> | Colladon |
| <i>Bong</i> | | Bongard | <i>Colm.</i> | Colmeiro |
| <i>Booth</i> | | Dr Booth | <i>Comm</i> | Commelin |
| <i>Bonpl</i> | | Bonpland | <i>Corn</i> | Cornuti |
| <i>Bork</i> | | Borkhausen | <i>Coss</i> | Cosson |
| <i>Bosc</i> | | Bosc a French botanist &c | <i>Cunn</i> | Cunningham A or J |
| <i>Borsz</i> | | Borszców | <i>Curt</i> | Wm Curtis |
| <i>Brack</i> | | Wm D Brackenridge | <i>M A Curt</i> | M A Curtis |
| <i>Brebis</i> | | Brebisson | <i>Cyrl</i> | Cyrilli an Italian botanist |
| <i>Bref</i> | | Brefeld. | | |
| <i>Brew & Wats</i> | | W H Brewer and Sereno Watson | <i>Dalech</i> | Dalechamps |
| <i>Brid</i> | | Bridel | <i>Dalb</i> | Dalibard |
| <i>Brong</i> | | Brongniart | | |
| <i>Broé</i> | | Brotero | | |
| <i>Brouss</i> | = | Broussonet | | |

List of Abbreviations.

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| | | | | |
|------------------------|---|--|-------------------|--|
| <i>Dals</i> | = | Dalzell | <i>Engl.</i> | Engler. |
| <i>Dals & Gibs</i> | | Dalzell and Gibson | <i>Eschs</i> | Eschscholtz. |
| <i>Darl</i> | | Darlington | <i>Eschw</i> | Eschweiler |
| <i>DC</i> | | | <i>Ettingsh</i> | Ettingshausen |
| <i>DeC</i> | } | A P DeCandolle. | | |
| <i>A DC</i> | | Alphonse DeCandolle son | <i>Falk.</i> | Falkner |
| <i>Cas DC</i> | | Casimir DeCandolle grand son. | <i>Fendl</i> | Fendler |
| <i>Decne</i> | | Decaisne | <i>Fenill</i> | Feniller, a Chilean botanist |
| <i>Deless</i> | | Delessert | <i>Feuill</i> | Feuillée |
| <i>Dennst</i> | | Dennstedt. | <i>Fingerh</i> | Fingerhuth |
| <i>Desc</i> | | Descourtiz | <i>Fisch.</i> | Fischer |
| <i>Desf</i> | | Desfontaines | <i>Fl Dan</i> | Flora Danica |
| <i>Desj</i> | | Desjardins | <i>Forsk</i> | Forskäl |
| <i>Desmar</i> | | Desmazières | <i>Forst</i> | Forster |
| <i>Desmoul</i> | | Desmoulins | <i>Fourn</i> | Fournier |
| <i>Desv</i> | | Desvaux | <i>Fresen</i> | Fresenius |
| <i>Dicks</i> | | Dickson an English crypto gamic botanist | <i>Freye</i> | Freyinet |
| <i>Diesb</i> | | Diesbach | <i>Frail</i> | Frölich |
| <i>Dieter</i> | | Dieterich | <i>Gärtn</i> | J Gärtner |
| <i>Dietr</i> | | Dietrich | <i>Gärtn f</i> | C T Gärtner |
| <i>Dill</i> | | Dillenius | <i>Gamble</i> | J S Gamble |
| <i>Dillw</i> | | Dillwyn | <i>Gardn</i> | Gardner |
| <i>Dod</i> | | Dodonæus (Dodæns) | <i>Garid</i> | Garidel |
| <i>Don</i> | | D Don | <i>Gasp</i> | Gasparrini |
| <i>D Don</i> | | Don (D) Prodrum floræ Nepalensis | <i>Gaud</i> | Gaudin |
| <i>G Don</i> | | Don (G) in Miller's Dictionary | <i>Gaudich</i> | Gaudichaud |
| <i>Donn Hort</i> | | Donn Hortus Cantabrigien sis 1796 | <i>Germ</i> | German |
| <i>Cantab</i> | | | <i>Gesn</i> | Gesner |
| <i>D Orb</i> | | D Orbigny | <i>Gilib</i> | Gilbert |
| <i>Dorst</i> | | Dorstenius | <i>Ging</i> | Gingins de Lassaraz |
| <i>Dougl</i> | | Douglas | <i>Gis</i> | Giseke |
| <i>Drej</i> | | Drejer | <i>Gled</i> | Gleditsch |
| <i>Dryand</i> | | Dryander | <i>Gleich</i> | Gleichen |
| <i>Dub</i> | | Dubois a French botanist | <i>Glox</i> | Gloxin |
| <i>Dufr</i> | | Dufresne | <i>Gmel</i> | J G Gmelin |
| <i>Duham</i> | | Duhamel du Monceau | <i>C Gmel</i> | C C Gmelin of Baden |
| <i>Dumort</i> | | Dumortier | <i>S Gmel</i> | S G Gmelin |
| <i>Dun</i> | | Dunal | <i>Godr</i> | Godron |
| <i>Eat</i> | | Amos Eaton | <i>Gapp</i> | Gœppert |
| <i>D C Eat</i> | | D C Eaton grandson | <i>Good</i> | Goodenough |
| <i>Edgew</i> | | Edgeworth | <i>Grah</i> | Graham (Dr J) Professor of Botany at Edinburgh |
| <i>Edw</i> | | Edwards | <i>Grah Cat B</i> | Graham's (J) Catalogue of Bombay plants |
| <i>Ehren.</i> | | Ehrenberg | <i>pl</i> | |
| <i>Ehret</i> | | Ehret (Geo Dion) | <i>Gren</i> | Grenier |
| <i>Ehrh</i> | | Ehrhart | <i>Grev</i> | Greville |
| <i>Eickl</i> | | Eichler | <i>Griff</i> | Griffith (Dr W) |
| <i>Eiseng</i> | | Eisengrein | <i>Griseb</i> | Grisebach |
| <i>Ell</i> | | Elliott | <i>Gran</i> | Grœnland. |
| <i>Endl</i> | | Endlicher | <i>Gron.</i> | } Gronovius |
| <i>Engelm.</i> | = | Engelmann | <i>Gronov</i> | |
| | | | <i>Gustt</i> | Guettard. |
| | | | <i>Gusb</i> | = Guibord |

| | | | |
|--------------------|---|------------------|---|
| <i>Guillem</i> | Guillemin | <i>Hueb</i> | Huebener |
| <i>Gump</i> | Gumpel. | <i>Humb</i> | Humboldt. |
| <i>Gunn</i> | Gunnerus | <i>H B K</i> | Humboldt, Bonpland, and Kunth |
| <i>Guss</i> | Gussone | | |
| <i>Habl</i> | Hablizl a Russian botanist | <i>Jack</i> | Jack (Dr William), a most distinguished botanist. |
| <i>Hagenb</i> | Hagenbach | <i>Jacq</i> | N J Jacquin |
| <i>Hall</i> | Haller | <i>Jacq f</i> | J F Jacquin son |
| <i>Ham</i> | Hamilton | <i>J St Hil</i> | Jaume St Hilaire |
| <i>Ham</i> | Hamilton (Dr Francis), formerly Buchanan | <i>Jord</i> | Jordan |
| <i>Hanb</i> | Hanbury | <i>Jungh</i> | Junghuhn |
| <i>Hanst</i> | Hanstein | <i>Juss</i> | A L Jussieu |
| <i>Hartm</i> | Hartmann | <i>Adr Juss</i> | Adrien Jussieu son |
| <i>Hartw</i> | Hartweg | | |
| <i>Harv</i> | Harvey | <i>Kamp</i> | Kämpfer |
| <i>Hass</i> | Hassall | <i>Karst</i> | Karsten |
| <i>Hassk</i> | Hasskari | <i>Kaulf</i> | Kaulfuss |
| <i>Hausm</i> | Hausmann | <i>Kindb</i> | Kindberg |
| <i>Haw</i> | Haworth | <i>King</i> | G King |
| <i>Hb Madr</i> | Herbarium (Madras) by Drs Klein Heyne and Rottler | <i>Kirschl</i> | Kirschleger |
| <i>Hebens</i> | Hebenstreit | <i>Kit</i> | Kitaibel |
| <i>Hedw</i> | Hedwig | <i>Koch</i> | Koch Professor at Erlang |
| <i>Hegelm</i> | Hegelmaier | <i>Kœlr</i> | Kœlreuter |
| <i>Hegetsch</i> | Hegetschweiler | <i>Koen</i> | Koenig (J Gerard) a Danish botanist and pupil of Linnaeus |
| <i>Heist</i> | Heister | <i>Korth</i> | Korthals |
| <i>Heldr</i> | Heldreich | <i>Kostel</i> | Kosteletzky |
| <i>Helw</i> | Helwing | <i>Kremp</i> | Krempelhuber |
| <i>Hemsl</i> | Hemsley | <i>Kromb</i> | Krombolz |
| <i>Henck</i> | Henckel | <i>Kth</i> | Kunth an eminent Prussian botanist |
| <i>Henfr</i> | Henfrey | <i>Kuetz</i> | Kuetzing |
| <i>Hensl</i> | Henslow | <i>Kunse</i> | Kunze a German Cryptogamic botanist |
| <i>Herb</i> | Herbert | <i>Kurs</i> | S Kurz |
| <i>Herm</i> | Hermann | | |
| <i>Hild</i> | Hildebrand | <i>L or Linn</i> | Linnaeus |
| <i>Hochst</i> | Hochstetter | <i>Labill</i> | La Billardière |
| <i>Hoffm.</i> | G F Hoffmann | <i>Last</i> | Læstadius |
| <i>H Hoffm</i> | Hermann Hoffmann | <i>Lag</i> | Lagasca |
| <i>Hoffmanns</i> | Hoffmannsegg | <i>Lall</i> | Lallement |
| <i>Hofm</i> | Hofmeister | <i>Lam</i> | Lamarck (Monnet de La Marck) |
| <i>Hohen</i> | Hohenacker | <i>Lam fl Fr</i> | Lamarck (J Be Monet de) Flore Francaise |
| <i>Holmsk</i> | Holmskiöld | <i>Lam fl</i> | Lamarck (J B Monet de) Illustration des genres |
| <i>Homb</i> | Hombrohn | <i>Lamb</i> | Lambert |
| <i>Hook</i> | Wm J Hooker | <i>Lamour</i> | Lamouroux |
| <i>Hook f</i> | J D Hooker son | <i>Langsd</i> | Langsdorf |
| <i>H f and T T</i> | Hooker f and T Thomson | <i>La Peyr</i> | La Peyrouse |
| <i>Hopk</i> | Hopkirk | <i>La Pyl</i> | La Pylaie. |
| <i>Hornem.</i> | Hornemann | | |
| <i>Hornsch</i> | Hornschuch | | |
| <i>Horsf</i> | Horsfield | | |
| <i>Houst</i> | Houston | | |
| <i>Houtt</i> | Houttuyn | | |
| <i>Huds</i> | Hudson | | |

List of Abbreviations

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| | | |
|----------------|---|--------------------------------------|
| <i>Laws</i> | — | Lawson |
| <i>Laxm</i> | | Laxmann, a writer on Siberian plants |
| <i>Ledeb</i> | | Ledebour |
| <i>Lehm</i> | | Lehmann |
| <i>Lem</i> | | Lemaire |
| <i>Lesch</i> | | Leschenault de la Tour |
| <i>Lesq</i> | | Lesquereux. |
| <i>Less</i> | | Lessing |
| <i>Lestib</i> | | Lestiboudois |
| <i>Léu</i> | | Léveillé |
| <i>L Her</i> | | L Heritier |
| <i>L Herm</i> | | L Herminier |
| <i>Liebm</i> | | Liebmänn |
| <i>Lightf</i> | | Lightfoot |
| <i>Lily</i> | | Liljeblad |
| <i>Lindb</i> | | Lindberg |
| <i>Lindbl</i> | | Lindblom |
| <i>Lindenb</i> | | Lindenberg |
| <i>Lindh</i> | | Lindheimer |
| <i>Lindl</i> | | Lindley |
| <i>Linn</i> | | Linnæus Also <i>L</i> |
| <i>Linn f</i> | | C Linnæus son |
| <i>Lockh</i> | | Lockhart (W) |
| <i>Lodd</i> | | Loddiges |
| <i>Læfl</i> | | Læfling |
| <i>Læs</i> | | Læselius |
| <i>Lois</i> | | Loiseleur Delongschamps |
| <i>Loud</i> | | Loudon |
| <i>Lour</i> | | Loureiro |
| <i>Ludw</i> | | Ludwig |
| <i>Lumn</i> | | Lumnitzer |
| <i>Lyngb</i> | | Lyngbye |
| <i>Macf</i> | | Macfadyen |
| <i>Macgil</i> | | MacGillivray |
| <i>Magn</i> | | Magnol |
| <i>M Bieb</i> | | Marschall von Bieberstein |
| <i>Marsh</i> | | Marshall (Humphrey) |
| <i>Mars</i> | | Marsili |
| <i>Mart</i> | | Martius |
| <i>Mass</i> | | Massalongo |
| <i>Mast</i> | | Masters |
| <i>Maxim</i> | | Maximowicz |
| <i>Med</i> | | Medikus or Medicus |
| <i>Meissn</i> | } | Meissner or Meissner |
| <i>Meissn</i> | | |
| <i>Meneg</i> | | Meneghini |
| <i>Menz</i> | | Menzies |
| <i>Mert</i> | | Mertens |
| <i>Metten.</i> | | Mettenius |
| <i>Mich</i> | | Micheli |
| <i>Michx</i> | } | André Michaux |
| <i>Mx</i> | | |
| <i>Michx f</i> | | F A Michaux, son |

| | | |
|-----------------------|---|--------------------------|
| <i>Midden</i> | — | Middendorff |
| <i>Mill</i> | | Philip Miller |
| <i>Mill f</i> | | John S Mueller or Müller |
| <i>Miq</i> | | Miquel |
| <i>Mirb</i> | | Mirbel |
| <i>Mitch</i> | | John Mitchell |
| <i>Mitt</i> | | Mitten |
| <i>Moc</i> | | Moçino |
| <i>Moen</i> | | Moench a German botanist |
| <i>Molk</i> | | Molkenboer |
| <i>Mont</i> | | C Montagne |
| <i>Moq</i> | | Moquin Tandon |
| <i>Moric</i> | | Moricand |
| <i>Moris</i> | | Morison |
| <i>Morr</i> | | Morren |
| <i>Moug</i> | | Mougeot |
| <i>Muell Arg</i> | | J Mueller of Argau |
| <i>F Muell</i> | | Ferdinand Mueller |
| <i>O Muell</i> | | Otto Mueller of Denmark |
| <i>Muhl</i> | | Muhlenberg |
| <i>Munt</i> | | Munting |
| <i>Murr</i> | | J A Murray |
| <i>A Murr</i> | | Andrew Murray |
| <i>Nacc</i> | | Naccari |
| <i>Næg</i> | | Nægeli |
| <i>Naud</i> | | Naudin |
| <i>Neck</i> | | Necker |
| <i>Nees or N ab E</i> | } | C F Nees von Esenbeck |
| <i>T Nees</i> | | |
| <i>Nestl</i> | | Nestler |
| <i>Newb</i> | | Newberry |
| <i>Newm</i> | | Newman |
| <i>Næg</i> | | Næggerath |
| <i>Nois</i> | | Noisette |
| <i>Nord</i> | | Nordstedt |
| <i>Not</i> | | Notaris |
| <i>Nutt</i> | | Nuttall |
| <i>Nyl</i> | | Nylander |
| <i>Nym</i> | | Nyman |
| <i>Æd</i> | | Æder |
| <i>Ærst</i> | | Ærsted |
| <i>Oliv</i> | | Olivier |
| <i>D Oliv</i> | | D Oliver |
| <i>Orb</i> | | A or C d Orbigny |
| <i>Orph</i> | | Orphanides |
| <i>Ort</i> | | Ortega. |
| <i>Oudem</i> | | Oudemans |
| <i>P de Beauv</i> | | Palisot de Beauvois |
| <i>Pall</i> | | Pallas |
| <i>Panz</i> | | Panzer |
| <i>Park</i> | | Parkinson |

| | | | | | |
|--------------------|---|-------------------------------------|---------------------|---|-----------------------------------|
| <i>Parl</i> | = | Parlatore | <i>Roxb</i> | = | Roxburgh. |
| <i>Pasq</i> | | Pasquale. | <i>Roxb H Bengl</i> | | Roxburgh's Hortus Bengalen |
| <i>Pav</i> | | Pavon. | | | 515 |
| <i>Perl</i> | | Perleb | <i>Royle</i> | | Royle. |
| <i>Pers</i> | | Persoon | <i>Royle III</i> | | Royle's Illustrations |
| <i>Philib</i> | | Philibert | <i>Roy</i> | | Royen |
| <i>Planch</i> | | J E Planchon | <i>Rubb</i> | | Rudbeck |
| <i>G Planch</i> | | Gustave Planchon | <i>Rupr</i> | | Ruprecht. |
| <i>Pluk</i> | | Plukenet. | <i>Sacc</i> | | Saccardo |
| <i>Plum</i> | | Plumier Lat. Plumerius | <i>Sadl</i> | | Sadler |
| <i>Pæpp</i> | | Pœppig | <i>St Hil</i> | | A Saint Hilaire |
| <i>Poir</i> | | Poiret | <i>Salisb</i> | | Salisbury |
| <i>Post</i> | | Porteau | <i>Salm Dyck</i> | | Prince Jos Salm Rifferschied Dyck |
| <i>Poll</i> | | Pollich | <i>Sauss</i> | | Saussure |
| <i>Post</i> | | Postels | <i>Schimp</i> | | Schimper |
| <i>Pourr</i> | | Pourret | <i>Schk</i> | | Schkuhr |
| <i>Pringsh</i> | | Pringsheim | <i>Schlecht</i> | | Schlechtendal |
| <i>Pritz</i> | | Pritzel | <i>Schlesch</i> | | Schleicher |
| <i>Putter</i> | | Putterlich | <i>Schomb</i> | | Schomburgch |
| <i>Rabenh</i> | | Rabenhorst | <i>Schrad</i> | | Schrader |
| <i>Radlk</i> | | Radlkofer | <i>Schreb</i> | | Schreber |
| <i>Raf</i> | | Rafinesque Schmaltz | <i>Schueb</i> | | Schuebeler |
| <i>Rasp</i> | | Raspail | <i>Schult</i> | | Schultes |
| <i>Red</i> | | Redouté | <i>Schults</i> | } C H Schultz Bipontinus (Zweibrucken) | |
| <i>Reich</i> | | Reichard | <i>Bip</i> | | |
| <i>Reichenb</i> | | H G L Reichenbach | <i>Schum</i> | | Schumacher |
| <i>Reichenb f</i> | | H G Reichenbach son | <i>Schnitts</i> | | Schnittlein |
| <i>Reinw</i> | | Reinwardt | <i>Schwagr</i> | | Schwägrichen |
| <i>Reiss</i> | | Reisseck | <i>Schwein</i> | | Schweinitz |
| <i>Retz</i> | | Retzius | <i>Schweinf</i> | | Schweinfurth |
| <i>Reut</i> | | Reuter | <i>Schwend</i> | | Schwendener |
| <i>Rheed auct</i> | | Rheede author of Hortus Malabaricus | <i>Scop</i> | | Scopoli |
| <i>Rich</i> | | L C Richard | <i>Seem</i> | | Seemann |
| <i>Rich f</i> | } | Achille Richard | <i>Sendt</i> | | Sendtner |
| <i>A Rich</i> | | | <i>Seneb</i> | | Senebier |
| <i>Richards</i> | | John Richardson | <i>Ser</i> | | Seringe |
| <i>Richt</i> | | Richter | <i>Seub</i> | | Seubert |
| <i>Ridd</i> | | Riddell | <i>Sibth</i> | | Sibthorp |
| <i>Riv</i> | | Rivinus | <i>Sieb</i> | | Sieber |
| <i>Rahl</i> | | Rœhling | <i>Sieb</i> | | Siebold |
| <i>Ram</i> | | J J Rœmer | <i>Sim</i> | | Simmonds |
| <i>M & Ram</i> | | M J Rœmer | <i>Sm</i> | | Smith (J E) |
| <i>Ram and Sch</i> | | Rœmer and Schultes | <i>Soland</i> | | Solander |
| <i>Rap</i> | | Rœper | <i>Sow</i> | | Sowerby |
| <i>Rohrb</i> | | Rohrbach | <i>Spenn</i> | | Spenner |
| <i>Roscoe</i> | | Roscoe | <i>Spreng</i> | | Sprengel |
| <i>Rostk</i> | | Rostkovius | <i>Sternb</i> | | Sternberg |
| <i>Roth</i> | | Roth (A W) | <i>Steud</i> | | Steudel |
| <i>Rothr</i> | | Rothrock | <i>Stev</i> | | Steven |
| <i>Rottb</i> | | Rottbœll | <i>Stocks</i> | | Stocks |
| <i>Rottl.</i> | | Rottler | <i>Sull</i> | | Sullivant |
| <i>Roum</i> | | Roumegère | <i>Sw</i> | | Swartz |
| | | | <i>Swt</i> | | Sweet (R) |

| | | | |
|----------------------|----------------------------------|-------------------|--|
| <i>Tabern</i> | = Tabernæmontanus (J T) | <i>Wahl</i> | = Wahlenberg |
| <i>Targ</i> | Targioni Tozzetti | <i>Wahlst</i> | Wahlstedt. |
| <i>Telf</i> | Telfair | <i>Walds</i> | Waldstein |
| <i>Ten</i> | Tenore | <i>Wall</i> | Wallich |
| <i>Thb</i> | Thibaud deChauvalon | <i>Wall Cat</i> | Wallich's Catalogue |
| <i>Thoms.</i> | Thomas Thomson | <i>Wallm</i> | Wallman |
| <i>Thonin</i> | Thonin | <i>Wallr</i> | Wallroth |
| <i>Thore</i> | Thore. | <i>Walp</i> | Walpers |
| <i>Thuill</i> | Thuillier | <i>Walt</i> | Walter |
| <i>Thunb</i> | Thunberg | <i>Wang</i> | Wangenheim |
| <i>Thurb</i> | Thurber | <i>Warm</i> | Warming |
| <i>Thurm.</i> | Thurman | <i>Watt</i> | G Watt |
| <i>Tod</i> | Todaro | <i>Wats</i> | P W Watson |
| <i>Torr</i> | Torrey | <i>H C Wats</i> | H C Watson |
| <i>Torr & Gr</i> | Torrey & A Gray | <i>S Wats</i> | Sereno Watson |
| <i>Tourn</i> | Tournefort | <i>Web</i> | Weber |
| <i>Trans Linn</i> | Transactions of the Linnæan | <i>Wedd</i> | Weddell |
| <i>Soc</i> | Society | <i>Weinm</i> | Weinmann |
| <i>Tratt</i> | Trattinick | <i>Welw</i> | Welwitsch |
| <i>Traut</i> | Trautvetter | <i>Wender</i> | Wenderoth |
| <i>Trev</i> | Treviranus | <i>Wendl</i> | Wendland |
| <i>Trim.</i> | H Trimen | <i>Wight icon</i> | Wight's Icones |
| <i>Trin</i> | Trinius | <i>Wight Ill</i> | Wight's Illustrations of Indian Botany |
| <i>Tuck</i> | Tuckerman | <i>W & A</i> | Wight and Arnott |
| <i>Turcs</i> | Turczaninow | <i>Wiks</i> | Wikstrom |
| <i>Turn</i> | Turner | <i>Wildb</i> | Wildbrand |
| <i>Turp</i> | Turpin | <i>Willd</i> | Willdenow |
| <i>Tussc</i> | Tussac | <i>Willk</i> | Willkomm |
| <i>Vahl</i> | Vahl (Prof Martin) of Copenhagen | <i>Wils</i> | Wilson |
| <i>Vaill</i> | Vaillant | <i>Wimm</i> | Wimmer |
| <i>Veill</i> | Veillard or Vieillard | <i>Wisls</i> | Wislizenus |
| <i>Vauch</i> | Vaucher | <i>With</i> | Withering |
| <i>Vent</i> | Ventenat. | <i>Woodv</i> | Woodville |
| <i>Vill</i> | Villars or Villar | <i>Wulf</i> | Wulfen |
| <i>Vis</i> | Visiani | <i>Zanard</i> | Zanardini |
| <i>Vittad</i> | Vittadini | <i>Zetterst</i> | Zetterstedt |
| <i>Viv</i> | Viviani | <i>Zucc</i> | Zuccarini |
| <i>Vog</i> | T Vogel | <i>Zuccag</i> | Zuccagini |

DICTIONARY

OF

THE ECONOMIC PRODUCTS OF INDIA

The *Abelia*.

ABELMOSCHUS

Abaca, a name in the Philippine Islands for Manilla Hemp—*Musa textilis*, which see

Abele, the Dutch name for the White Poplar see *Populus alba*.

ABELIA, *R Br Gen Pl* * *Vol II*, 4

I

A genus of shrubs (belonging to the Natural Order CAPRIFOLIACEÆ) containing in all only five species distributed from Kashmir to China and Japan. They are characterised by having opposite ex-stipulate leaves. *Calyx* adnate to the ovary, lobes elongate. *Corolla* regular or nearly so funnel shaped with five short rounded teeth. *Style* long. *Stigma* capitate. *Ovary* 3-celled two cells being many-ovuled but early aborted the other developing. *Fruit* elongated coriaceous 1-seeded.

This genus was named by R. Brown after the Chinese explorer Mr. Clarke Abell. The species belonging to it are more objects of ornament than of utility. *A. floribunda* from Mexico has purple-red flowers and *A. rupestris* from China has pale rose-coloured flowers.

There is only one species met with in India.

Abelia triflora, *R Brown Fl Br Ind* † *III*, 9

2

Vernacular Names used in different parts of India—*Adei* paktawar PUSHTO (TRANS INDUS) *Cheta buta* JHELUM VALLEY, *Ban bakhara* *salanker* CHENAB VALLEY *Dalung kut sâi* RAVI VALLEY *Zbang matabang peni* SUTLEJ VALLEY *Munri gogatti humki* KUMAON

Habitat—A large shrub met with in Safedkoh and the Suliman Range North West Himalaya between 4000 and 10000 feet also from Kashmir to Kumaon.

Properties and Uses—

Structure of the Wood.—Hard close and even grained. Weight 65 lbs per cubic foot.

Not used except for walking sticks.

TIMBER

3

ABELMOSCHUS, *Medik Gen Pl*, I, 208

4

A generic name formerly given to a group of species now referred to the genus *Hibiscus*. They are characterised by having an elongated spathaceous calyx. The word *Abelmoschus* is derived from the Arabic signifying musk-seeded in allusion to the odour possessed by the seeds of *Hibiscus Abelmoschus*, *Linn*.

* By *Gen Pl* is meant Bentham and Hooker's *Genera Plantarum*
† *Fl. Br. Ind.* means Sir J. D. Hooker's *Flora of British India*

**ABIES
excelsa.****Indian Hemlock Spruce and the Fir****Abelmoschus esculentus**, *W & A*, *O'Shaughnessy, Beng Disp*, 217Syn used by old authors for *Hibiscus esculentus*, *Linn*, which see**A. ficulneus**, *W & A* (as in *Drury*)Syn for *Hibiscus ficulneus*, *Linn*, which see**A. moschatus**, *Mærch*Syn used by old authors for *Hibiscus Abelmoschus*, *Linn*, which see**A. strictus** (as in *Voigt*)Syn for *Hibiscus ficulneus*, *L* which see

5

ABIES, *Juss Gen Pl III 441*

A genus of lofty evergreen monœcious trees belonging to the Natural Order CONIFERÆ containing some 18 species widely distributed throughout the colder temperate regions. *Leaves* single spirally arranged or in two rows needle-shaped or narrow linear. *Male-cathkins* single in the axils of the leaves. *anther cells* two. *Ovules* inverted in pairs at the base of the capillary scales. *Cones* ripening the same year terminal or lateral erect or pendulous. *Seeds* oily winged.

The members of the genus *Abies* are popularly known as the FIRS in contradistinction to the PINES (*Pinus*). Professor W T Thiselton Dyer has kindly drawn my attention to the fact that the genus *Abies*, as viewed by Indian authors has in the *Genera Plantarum* been broken up into the following *Picea*, *Link*, *Tsuga*, *Carr*, *Pseudotsuga*, *Carr* and *Abies*, *Juss*. It was found impossible however to effect the rearrangement which this necessitates owing to the *Genera Plantarum* having only reached my hands after a great part of vol I was in type. The correct genera of the Indian species will be found indicated under each.

In India there are three important species —

6

Abies dumosa, *Loudon* (in *Gen Pl* referred to *Tsuga*)**THE INDIAN HEMLOCK SPRUCE**

Vern — *Changathasi dhup thingra thingani sula* (Gamble) or *tingurs salla* (Atkinson) NEPAL, *Tangshing* or *tungsing* BHUTIA *Dárma KUMAON* *Tanghing Suram N E KUMAON* (Duthie) *Semadung* (Gamble) or *semadung* (Atkinson) *chemdang* LEFCHA

References — *Brandis For Fl 52 Gamble Man Timb 408*

Habitat. — A large tree met with in North East Kumaon Nepal and Sikkim between 8 000 and 10 500 feet. In Kumaon 3 650 acres are under this tree.

Botanic Diagnosis — *Cones* 1 inch long occurring on the ends of the branches. *Leaves* white underneath.

Properties and Uses —

Resin — Little or nothing is known regarding its resinous properties.

Structure of the Wood. — Soft with a slight pinkish tinge. Weight 27 to 29 lbs per cubic foot.

Used in Sikkim for shingles. It is suitable for planking and rough furniture.

Domestic Uses — The bark is used for roofing.

A. excelsa, *DC* (in *Gen Pl* referred to *Picea excelsa*, *Link*)

THE SPRUCE FIR OF EUROPE, *Eng*, POIX DE BOURGOGNE OU DES VOSGES, *Fr* FICHTENHARZ, TANNENHARZ, *Ger*

Habitat. — A noble tree found in the mountains of Central Europe, in Norway, Sweden, and Russia introduced into India.

A 10

RESIN
7
TIMBER
8
DOMESTIC
Bark
9
10

Resin, Turpentine, Oil of Turpentine, and Burgundy Pitch.

ABIES
Smithiana.

Botanic Diagnosis.—This species much resembles the *Himálayan A. Smithiana*.

Properties and Uses—

Description of the Resin.—A yellowish-brown opaque substance, which naturally exudes from the bark hard and brittle when cold strongly adhesive has an agreeable aromatic odour especially when heated

Chemical Composition.—§ The resins obtained from the *Coniferæ* according to Maly are all similar. The oleo-resinous exudations known as **TURPENTINE** consist of an amorphous resin $C^{44}H^{69}O^4$ mixed with an essential oil or hydrocarbon of the composition $C^{10}H^{16}$. **Burgundy Pitch** is obtained from *Picea excelsa*, it has been deprived more or less of its essential oil by evaporation but it is not a turpentine. The so-called **Turpentine** possess their essential oil they are obtained from *Pinus Pinaster* (in France) and *Pinus australis* (in America). If exposed to water or moisture the amorphous resin contained in the turpentine combines chemically to a certain extent with the water and becomes opaque and crystalline being transformed into a substance having the character of an acid. When crude soft turpentine is distilled nearly the whole of the **OIL OF TURPENTINE** passes over while the resin (*rosin* or *colophony*) remains. If this substance still contains a little water it is known as *yellow rosin* if completely deprived of water it is *transparent rosin* and by a continued application of heat it becomes *black rosin*. The crude turpentine which concretes upon the stem is termed in France *galipot* or *barras*. The American concrete crude turpentine is known in trade as common *Frankincense* or *gum Thus*. **OIL OF TURPENTINE** is distilled from the liquid crude turpentine collected in *boxes* or artificial cavities cut on the trunk of the tree. This liquid substance is technically called *Dip*. The first year's flow from a new tree is called *Virgin Dip* this yields the best quality of turpentine oil and of rosin. From the wood of *Coniferæ* a crystalline glucoside *Coniferin* has been isolated by *Rube*.

The essential oils of the various coniferous resins vary considerably. Of the turpentine the two most important varieties commercially are the French and the American that chiefly used in England being the American. *Canada Balsam* and *Strassburg Turpentine* are also well known coniferous products. Hydro-carbons similar to those obtained from the *Coniferæ* are also derived from *Rutaceæ*, *Myristicæ*, *Lauraceæ*, *Umbelliferæ* and even from some *Labiataæ*.” (*Surgeon C F H Warden, Prof Chemistry Medical Colleg Hospital Calcutta*)

Medicine—The resinous exudation from the stem of *Picea excelsa* is officinal in the *Pharmacopœia of India* and is used as a stimulant and rubefacient always applied in the form of plaster. It is known to English writers as **BURGUNDY PITCH** although that term as used by French authors and popularly in many English works has a wider significance being applied to the turpentine of other *Coniferæ*.

RESIN
II

Turpentine
Galipot.
I2
Gum thus
I3
Oil of
Turpentine.
I4
Rosin or
Colophony
I5

MEDICINE
Burgundy
Pitch.
I6

I7

Abies Smithiana, Forbes (in *Genl Pl* referred to *Picea*? *Morinda*, *Link*)

THE HIMÁLAYAN SPRUCE

Vern.—*Wesha bayár* AFG *Kachal kachan* HAZARA KASHMIR
Rewari rái ban lúdar sangal salla salie sarei káulí roi rag ráo
bang ré krot PB HIMÁLAYA generally; *Tos RAVI*; *Rau rausang re ro*
SUTLEJ *Rai JAUNSAIR*; *Kandre re rhas ráo rai khutrau* (Brandis)

§ Information specially contributed to this work by the authors whose names follow each paragraph

**ABIES
Webbiana****The Silver Fir yields**

and Gamble) or *kudrau* (Atkinson) *ridlla* or *rás dla rágha*, *morinda* *kail káluchslu klu* GARHWAL KUMAON *Rayang* KANAWAR *Sh shing* BHUTIA *Landar anandar* names used at timber depôts

References—*Brandis For Fl 527, Gamble Man Timb 407, Stewart's Pb Pl p 210 Atkinson Gas N W P X p 834 Madden, Jour Agri Hort Soc Ind VII 87 Baden Powell I 564*

Habitat.—A lofty tree met with in the North West Himálaya between 7 000 and 11 000 feet in Sikkim and Bhután in the inner valleys between 7 000 and 10 000 feet, and in the mountains of Afghanistan Kafiristan and Gilgit

Botanic Diagnosis—*Cones* 4 6 inches long occurring at the ends of the branches drooping pale green when young *scales* persistent *Leaves* stiff, sharp, 4 sided green spirally arranged when young crowded into pendulous tail like twigs

An elegant tree growing rapidly in moist localities where not under too much shade

Resin—It yields a resin of no importance.

Structure of the Wood—White with a reddish or brown tinge a little harder than that of *A Webbiana*. The inner belt of annual rings soft and spongy Weight on an average 30 lbs per cubic foot

The wood is extensively used locally *eg* in Simla for packing cases rough furniture and planking and sometimes for shingles It crackles and sends out sparks in burning and is consumed very quickly but it is in much demand for charcoal

Domestic Uses—The *bark* is used for roofing shepherd's huts and the *leaves* are collected by the hill people as a manure and they are also stored for winter use as a litter for cattle

Abies Webbiana, Lindl (in *Gen Pl* referred to *Picea Webbiana, Loud*)

THE HIMÁLAYAN SILVER FIR

Syn—*ABIES WEBBIANA Lindley A SPECTABILIS Spach ABIES DENSA Griffith PINUS TINCTORIA Wall P WEBBIANA Wall*

Var *PINDROW Loudon* the flat horizontal branches of this Western form give it a very distinctive effect from the variety *Webbiana* proper met with in Sikkim and Bhután

Vern—*Paludar rewari* JHELAM *Bádar budar tung* KASHMIR *Dhánu rág rail pe re salla sara* CHAMBA *Tos KULU Spun pun krok kalrei* KANAWAR *Bharda thanera* SHALE *Burla pindrau pindras* HATTU *KúdroM MATIYANA Burul burra buldu BHAJJI Kalrai sairai chur, KOTKAI Raho row chilrow kilaunta* CHOR *Morinda JAUNSAI Bang dodhma ragha teliya or chil ragha*, SOUTH EASTERN GARHWAL *Chilrao CENTRAL GARHWAL Morunda* NORTH WEST GARHWAL *Raunsia or rá salla KOSI RIVER Ragha rao rágha ransla raisalla KUMAON Wuman wumbusing (Mr Duthe) BYANS Gobra sulah NEPAL Dumshing BHUTIA*

References—*Brandis For Fl 528; Gamble Man Timb 408; Atkinson Gas N W P X 837, Madden Jour Agri Hort Soc Ind VII 96*

Habitat.—A lofty evergreen tree, met with in the Himálaya, from the Indus to Bhután in the North West Himálaya between 7 000 and 13 000 feet in the inner ranges of Sikkim and Bhután, between 9 000 and 13 000 feet in the outer ranges not below 10,000 feet

Botanic Diagnosis—*Cones* lateral, erect 4 6 inches long, solitary or clustered, dark blue when young *scales* deciduous *Leaves* flat narrow, linear, spirally arranged but spreading in one plane so as to appear distichous

Resin.—It yields a white resin which is sometimes used medicinally in India

§ "Hakims affirm that the resin of *Abies Webbiana*, mixed with oil of

RESIN
18
TIMBER
19

DOMESTIC
Bark
20
Leaves.
21
22

RESIN
23

Resin, Dye, Medicine, Food, and Timber

ABIES
Webbiana.

roses, when taken internally, produces intoxication This mixture is used externally for headache, neuralgia, &c" (Surgeon G A Emerson Calcutta)

Dye.—Mr Duthie, Superintendent of the Botanic Garden, Saharanpur, has drawn my attention to the fact that Veitch in his *Manual of Conifera*, states that a beautiful violet dye is extracted from the young cones of this plant It is remarkable that neither Stewart, Brandis nor Gamble alludes to this dye while in *Gordon's Pinetum* occurs the following It is called *Ras sulla* (fragrant fir) and *Gobrea sulla* (fragrant or indigo fir) by the Gorkhalis on account of an indigo or purple pigment being extracted from the young cones It would be exceedingly interesting to have this dye properly confirmed by fresh information and specimens of the dye stuff and cloths dyed by this process also information as to the extent this curious dye is actually used by the hill tribes of India

Medicine—The dried leaves of this plant (*Tālispatra* HIND and BENG, *Tālisapatra* SANS) are regarded as carminative expectorant stomachic, tonic and astringent useful in phthisis asthma bronchitis, and catarrh of the bladder The powdered leaves are often given along with the juice of *Adhatoda Vasica* and honey and a confection called *tālisādyā churna* is prepared from the *tālispatra* along with pepper ginger bamboo manna cardamoms cinnamon and sugar The *tālispatra* also enters into the preparation of numerous complex prescriptions (*U C Dutt's Hindu Mat Med*) In Ainslie and the earlier writers on Indian Economic Botany *tālispatra* *tālisapatra* DUK and HIND and *tālisha vidara* SANS are the vernacular names for the dried leaves and twigs of *Flacourtia Cataphracta*, the *panyala* of Bengal (*Ainslie II* 407)

In his *Manual of Indian Timbers* p 17 Mr Gamble gives *tālispatra* as the Hindi name for *Flacourtia Cataphracta*, Roxb and this is also the name given by Babu T N Mukharji in his *Amsterdam Catalogue* Surgeon U C Dutt informs me that he is of opinion *Abies Webbiana* is the *tālispatra* of the ancient Sanskrit writers and that specimens of the drug which he submitted to Dr King were found to be the leaves and twigs of this plant It seems difficult to account however for a man of Dr Ainslie's ability mistaking the ovate leaf of a *Flacourtia* for the needle-shaped leaves of a Fir and having few or no authors to compile from, he must have personally identified the plants of which he wrote and ascertained locally that *Flacourtia* was the *tālisha* of the shops of South India.

The Hindu Doctors of Behar according to Dr F Hamilton use an infusion of *tālispatra* in the treatment of hoarseness It is probable that in different parts of India the dried leaves of various plants receive the name of *tālispatra* provided they are found useful in the treatment of coughs It seems likely however that the leaves of *Abies Webbiana* are the original or true *tālispatra*

Dr Dymock states that the *tālispatra* of the Bombay shops (also called *Barms*) consists of the leaves and young shoots of *Taxus baccata*, Linn While admitting that the *tālispatra* of the ancients has not been identified for certain he quotes under *Taxus* the properties and mode of prescribing the *tālispatra* as given by Surgeon U C Dutt, an author who refers it to *Abies* The importance of this observation lies in the fact that the therapeutic properties of *Abies* and *Taxus* are widely distinct and therefore these distinct plants, one would imagine, could not possibly be used for the same purposes (See *Taxus*.) Since writing the above however, I have seen in Calcutta a specimen of a drug called *tālispatra* which I believe to be the leaves of *Taxus*, and Mr Woodrow says that it is the leaves of that plant which are sold in Poona as the *tālispatra* The whole subject is thus exceedingly obscure

DYE.
Young Cones.
24

MEDICINE
Leaves
25

| ABIR. | The Hindú Abír and Gulál Powders. |
|------------------|--|
| MEDICINE. | <p>The description of the <i>talispatra</i> in some of the older books on Indian medicinal plants would agree very well with the leaves of a <i>Cinnamomum</i>,—much better in fact than with those of an <i>Abies</i>. Surgeon Moodeen Sheriff gives <i>talíshapatrí</i> as the Tamil and Telegu names for <i>C. Tamala</i>, <i>Nees</i> and also the Arabic and Persian for the leaves of that plant. He may be quite right in this opinion, modern usage having appropriated the name to <i>Abies</i> and <i>Taxus</i>. But one only of the plants referred to in this critical note can be the true <i>talispatra</i> since they have such distinct properties. It seems clear however, that in different parts of the country different plants are prescribed as <i>talispatr</i> and it is quite probable that none of them are the true <i>talispatra</i> of the Sanskrit writers.</p> |
| 26 | <p>Special Opinions—§ <i>Talispatra</i> (leaves of <i>Abies Webbiana</i>) are sold in all <i>Bansahs</i> shops in Bengal Behar and the N W Provinces. I do not think any other leaf is used in these provinces under the name of <i>Talísha patrí</i> (Surgeon U C Dutt Serampur). The <i>Talispatra</i> of the Bombay shops also called <i>Barmi</i> consists of the leaves and young shoots of <i>Taxus baccata</i>. Many of the shoots bear the male flowers of that plant. If this is the source of the <i>Talispatra</i> of Sanskrit writers we ought to have a Sanskrit name <i>Talish</i> for the tree and the Hindi name would probably be similar (Surgeon Major W Dymock Bombay). The same argument is equally against <i>Taxus baccata</i>, since in no Indian language is the tree called <i>talísha</i> nor by any name that could be called a derivative from that word (G Watt). The Bhuj Hakim uses the dried leaves when a carminative action is needed dose half to one drachm internally (Surgeon W Barren Bhuj Cutch Bombay).</p> |
| 27 | <p>The juice of the fresh leaves is used as a family medicine in fevers acting as an antiperiodic for infants dose 5 to 10 drops in water or mother's milk. It is also prescribed in affections of the chest and during dentition. In Bengal it is given as a tonic after parturition (Surgeon J Mc Conaghey Shahjahanpur).</p> |
| FODDER | <p>Fodder—In tracts near the Jhelum the twigs and leaves are cut and stored for winter use as fodder and litter for cattle (Brandis). That cattle could eat the dried leaves of this plant seems incredible and at strange variance with their reputed medicinal properties.</p> |
| Leaves | <p>Structure of the Wood—White soft. The inner zone of each annual ring is soft and spongy. Weight about 29 lbs per cubic foot.</p> |
| TIMBER | <p>The wood is not durable when exposed to the weather but seems to last well as shingles in Sikkim whence it is sometimes exported to Thibet for roofing. At Murree shingles are said to last eight to ten years and in Kulu three to six. In Kanawar and Lahoul it is much used for construction. Very little information exists regarding the rate of growth.</p> |
| 29 | <p>Domestic Uses—The bark is used for roofing shepherds' huts and it is also made into troughs for the salt given to the sheep grazing on the higher Himálaya.</p> |
| DOMESTIC | ABIR |
| Bark | <p>Abir (sometimes called <i>Phák Beng</i> or <i>Phaku Ass</i>) or the white perfumed powder which is mixed with the red <i>Gulál</i> powder and used at the <i>Holi</i> festival.</p> |
| 31 | <p>Dr McOann in his <i>Dyes and Tans</i> publishes from the records of the Bengal Economic Museum as the practice adopted in Mymensing the following description—</p> |
| Bengal | <p><i>1st</i>—The <i>shatí</i> is washed and pounded in a <i>dhenki</i>. The powder is then put into an earthen vessel full of water and allowed to rot. The water is afterwards poured off and the powder dried. It is then mixed with the juice extracted from <i>bakram</i> wood. This turns it red and it is then called <i>Abír</i> or <i>Holi</i> powder. <i>Shatí</i> is gathered for this purpose in the</p> |
| Powder with | |
| bakram | |
| 32 | |

| The Abroma. | ABROMA. |
|---|-----------------------------------|
| month of <i>Poos</i> (December January)" There is no mention of alum in the above, but without that substance the colour could not be produced | ABIR |
| The practice which seems to prevail in most other parts of India is to prepare the two powders quite distinct from each other, and to mix them as required | |
| 2nd—The Bengal <i>Holi</i> powder is prepared from <i>Curcuma Zedoaria</i> , <i>Roscoe</i> (or common flour or arrow root) Sappan wood and alum 'In Bengal aniline magenta is now largely used to colour the flour obtained from <i>Zedoaria</i> , and being cheaper has almost superseded the older preparations' (<i>Mr I N Mukharji Calcutta</i>) Dr Buchanan Hamilton says that in some parts of Bengal the yellow dye obtained from <i>Bixa Orellana</i> is used as a <i>guld</i> | Bengal Powder with aniline. 33 |
| Dr Dymock has favoured me with the following list (Nos 3 to 7) of <i>Abir</i> powders — | |
| 3rd — The Bombay <i>Holi</i> powder or <i>Guld</i> is made of flour coloured with Sappan wood and alum (<i>Surgeon Major W Dymock Bombay</i>) | Bombay Powder 34 |
| 4th—A whitish <i>Abir</i> made from the following — | White Abir 35 |
| <i>Andropogon muricatus</i> <i>Hedychium spicatum</i> . <i>Santalum album</i> <i>Sorghum vulgare</i> (flour) | Ghisi Powder 36 |
| 5th—The buff coloured Hindi <i>Gulal</i> known as <i>Ghisi</i> , contains, in addition to the above the following — | |
| <i>Cerasus</i> (<i>Prunus</i>) <i>Mahaleb</i> <i>Artemisia Sieversiana</i> (imported) <i>Cedrus Deodara</i> <i>Curcuma Zedoaria</i> Cloves Cardamoms | |
| 6th—Deccan <i>Abir</i> or <i>Bukka</i> is of a black colour and in addition to all the above contains the following — | Bukka or Deccan Abir 37 |
| <i>Aquilaria Agallocha</i> Costus Root (<i>Saussurea Lappa</i> , <i>CBC</i> formerly <i>Aucklandia Costus Falc</i>) Jatamansi Liquid Storax | |
| 7th—The <i>Abir</i> of the Jains is of a pale yellow colour It is called <i>Vasakshep</i> it is made of— | Jain Abir 38 |
| <i>Santalum album</i> . Saffron Camphor (Borneo) Musk | |
| 8th— <i>Voigt</i> in his <i>Hortus Sub Calc</i> states that <i>Trapa bispinosa</i> (the Singara nut) is used as an <i>Abir</i> During the <i>Holi</i> festival a red dye is made of it mixed with the yellow dye procured from the flowers of <i>Butea frondosa</i> . <i>Drury</i> apparently quotes this paragraph I presume the flour of the Singara nut is simply used in place of rice or wheat flour and coloured with the <i>gulal</i> My friend Major Pitcher informs me however that in Oudh the flour from the Singara nut is used during the <i>Holi</i> Professor W T Thiselton Dyer also writes me that a specimen of <i>Abir</i> composed of Singara nut flour coloured with <i>Butea frondosa</i> , was received by the Kew authorities from the late Indian Museum It would thus appear that the use of Singara nut flour is more general than was thought What peculiar merit it is supposed to possess I have been unable to discover The use of <i>Butea frondosa</i> as <i>Gulal</i> is, however referred to by several authors See <i>Butea</i> . | Pulas Gulal. 39 |
| Absorbent —(L <i>ab</i> from <i>sorbeo</i> I suck up) Applied adj and subs to anything which absorbs acidity in the intestinal canal or blood and other fluids from any part of the body For list of Indian Absorbents, see "Drugs | |
| ABROMA , <i>Jacqr Gen Pl, I., 224</i> | 40 |
| A genus of trees or shrubs (belonging to the Natural Order STERCULIACEAE) containing in all two or at most three species natives of tropical Asia Leaves cordate angled Petals purple-coloured, concave at the base, with | |

**ABROMA
augusta.**

An Important Fibre.

a stipulate ovate blade *Andracium* tubular, *stamens* 1-seriate *anthers*
marginal 2 4 between each staminode *Capsule* membranous, 5-angled and
5 winged *Seeds* numerous

The word Abroma is derived from α and $\beta\rho\omega\mu\alpha$ —unfit for food.

41

Abroma augusta, Linn , *Fl Br Ind*, I, 375

ABROME, Fr ABROME, Ger

Vern —*Ulatkambal* BENG HIND and CUTCH

References —*Roxb Fl Ind Ed C B C*, 510 *Gamble Man Timb* 45 ;
Atkinson Gas N W P X 792, *Drury U P 2 U S Dispens.*
Ed 15th 1559

Habitat.—A small bush widely distributed (native or cultivated) throughout the hotter parts of India.

Botanic Diagnosis.—A large spreading shrub with leaves and branches softly hairy *Sepals* lanceolate almost free to the base and nearly as long as the petals *fruit* becoming more than twice the length of the persistent calyx It flowers most profusely during the rains, and the seeds ripen in the cold season

Properties and Uses—

Fibre—The bark of the twigs yields a much valued fibre, which deserves to be more generally known It might be used with advantage as a substitute for silk The plant yields three crops a year *Roxburgh* says of this plant 'The bark abounds with strong white fibres which make a very good substitute for hemp and as the plant grows so quickly as to yield two, three or even four crops of cuttings annually fit for peeling' it may with advantage be cultivated for its fibre It is a large and more easily cultivated plant than jute or *sunn*, and is a perennial while the produce is as great if not greater and the fibre as easily separated With all these facts to recommend it it seems remarkable that we should have had to urge the claims of this fibre for over 50 years without its having attained the high commercial rank which its great beauty softness cheapness and durability deserve There are many purposes to which jute is put nowadays which Abroma could meet with greater acceptance and which it most certainly would by this time have supplied but for the unparalleled early success of jute The future seems likely to raise Abroma however to a position of great importance

'To separate the root bark from the shoots maceration in stagnant water from four to eight days answers well during the warmer parts of the year while three times as much is scarce sufficient during the cold season indeed the process is scarcely practicable then besides the fibres are generally weakened by prolonged maceration The fibres being naturally very white and clean they do not require to be cleansed *Dr Roxburgh* states that in its native state without being dressed in any way it is about one tenth part stronger than *sunn*, and in that state much more durable in water A cord of its fibre bore 74 lbs when *sunn* broke with 68 lbs.' (*Royle's Fibrous Plants of India* p 267)

There can be no doubt that sooner or later the trade in jute having lost the enormous profits obtained during its early history, will subside into an old and established industry The demand for some new fibre to give life to the progressive textile industries will then turn to **Abroma**, **Agave**, **Yucca**, **Abutilon** and a few others but to the owners of jute mills and jute machinery **Abroma** seems the most likely to prove the new outlet for enterprise

Medicine.—The bark of the root is an emmenagogue, which does not appear to have received the attention it deserves In the *Indian Medical Gazette* for 1872, Mr **Bhoobun Mohun Sircar** gives an account

FIBRE
Bark
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MICINE
t bark.
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Indian Liquefics.

ABRUS.

MEDICINE.

of the uses of this drug, specially recommending it in the treatment of dysmenorrhœa. It seems to be the fresh viscid sap from the root bark which possesses the properties attributed to this plant. Half a drachm is given at a dose (*Am Four Med Science, July 1873 p 276*)

Dr Kirton in a correspondence with the Home Department, Government of India says. Fresh root beat into paste with water dose 1 drachm in dysmenorrhœa

Special Opinions —§ Is a valuable medicine in dysmenorrhœa. The way in which it is usually given is the fresh root of the plant made into a paste with black pepper. The medicine is given about a week before the menstruation begins and is continued till it commences. I have seen it prove very efficacious in some cases especially the congestive form of the disease (*Surgeon R Macleod M D Gya*). Two ounces of dried bark boiled in one pint of water will make a good decoction. An ounce thrice daily acts well in cases of dysmenorrhœa (*Surgeon R L Dutt M D Pubna*). Have never used it as an emmenagogue but the infusion of fresh leaves and stems in cold water is demulcent and very efficacious in gonorrhœa (*Surgeon C F W Meadows Burrisal*). A well known emmenagogue in Bengal said by some native doctors to possess antispasmodic properties (*Surgeon F McConaghey Shahjahan pur*). Useful in dysmenorrhœa (*Surgeon F Anderson, Bijnor*)

The slender roots of this plant are useful in the congestive and neuralgic varieties of dysmenorrhœa. It regulates the menstrual flow and acts as a uterine tonic. It should be given during menstruation 1½ drs of the fresh root for a dose with black pepper the latter acting as a stomachic and carminative (*Brigade Surgeon F H Thornton Monghyr*). "I have tried the green tender roots and also the bark of roots in two-drachm doses with a few grains of pepper just to cover the bland taste of it in congestive dysmenorrhœa with excellent results. It is to be given as soon as the vague sense of discomfort and weight in the loins begins and should be continued till the flow appears (*Assistant Surgeon Devendro Nath Roy Sealdah Calcutta*)

I used the root bark in three cases of dysmenorrhœa in which it was vaunted as a specific but without any effect (*Surgeon Shib Chunder Bhattachary, Chanda Central Provinces*). Babu B M Sarkar of Calcutta is selling pills made of this as a successful remedy for dysmenorrhœa and I have heard of good effects from it. Requires a trial (*Surgeon K D Ghose Khulna*). Action tonic (*Surgeon W Barren Bhuj Cutch Bombay*). Has never failed in my hands in speedily relieving painful dysmenorrhœa (*Surgeon B Evers M D Wardha*). In my personal experience I know the root is very efficacious in cases of amenorrhœa as an emmenagogue (*Assistant Surgeon Shib Chunder Basu Bankipur*). Reported to be an emmenagogue said to remove sterility in cases depending on dysmenorrhœa but it has failed in two cases in my hand (*Assistant Surgeon Bolly Chand Sen Sealdah Calcutta*)

ABRUS, Linn Gen Pl I, 527

A genus of climbing shrubs (belonging to the Sub-Order PAPILIONACEÆ of the Natural Order LEGUMINOSÆ) comprising 5 species, cosmopolitan in the tropics. Leaves equally pinnate, leaflets numerous and deciduous. Calyx campanulate teeth short. Corolla much exerted standard adhering below to the staminal tube. Stamens 9, united into one bundle the upper most and tenth one being abortive. Pod dehiscent (exposing the red shining seeds) not jointed

The word Abrus is derived from the Gr ἀβρός, graceful, either in allusion to the graceful, delicate leaves, or elegant, shining seeds

ABRUS
precatorius

Indian Wild Liquorice

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50
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In India there are three species closely allied and economically viewed as but forms of one species. These may be briefly distinguished thus —

- A. precatorius** Linn Pod oblong turgid 3 5 seeded
A. pulchellus, Wall Pod linear flat incurved 9 12 seeded
A. fruticulosus Wall Pod linear oblong flattish 4-6 seeded

Abrus precatorius, Linn Fl Br Ind II 175

INDIAN OF WILD LIQUORICE ROOT Eng LIANE A RÉGLISSE
RÉGLISSE D'AMÉRIQUE Fr

Vern—*Gaungchi rati, chirmiti* HIND *Ratak labri* PB *Gunjá ghung chi* BOMB *Gumchi* DUK *Chanoti* GUJ *Rat* CUTCH *Ma pati* NEPAL *Kunch gunch chun hati* BENG *Kawet* SANTAL *L tuwani* ASS *Gunja gunjd krishnala kakachinchi* SANS *Aainu-ddik* ARAB *Chashmkhuro* PERS *Gundamani* TAM *Ghurie ghénza* IEL *Ywe guwe* or *gyin ywe* BURM

References—*Roxb Fl Ind Ed C B C 544 Drury's U P p 3 Brandis For Fl 139 Gamble Man Timb 121 C I H Warden in Year Book Phar 1882 p 211, Fluck and Hanb 1 Pharmacog 2nd ed 188 Bentl and Trim Med Pl 25 Dymock's Drugs of W Ind p 183 Stewart's Pb Pl p 50 Atkinson Gas N W I X pp 7 24 767*

Habitat—A beautiful climber met with all along the Himalaya ascending to altitude 3000 feet and spreading through the plains of India to Ceylon and Siam.

Botanic Diagnosis—There are three principal varieties under this species described by Roxburgh —

- 1st—With rose coloured flowers and red seed with black eye
2nd—With dark coloured flowers and black seed with white eye
3rd—With white flowers white seed

§ The white variety as seen here has no black eye (*Dr Dymock Bombay*)
Properties and Uses—

EDICINE
Root
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Medicine—*LHF ROOT Ainslie* and *O Shaughnessy* say is a perfect substitute for liquorice in every way. Modern authors differ from them in this opinion. According to Sanskrit writers it is emetic and useful in poisoning. *Dr Bidie* says The *Abrus* root has little or no saccharine taste and would form a very indifferent substitute for liquorice. Liquorice root is largely imported into India and extensively used in native medicine and is probably often sold under the same vernacular name as that given to the *Abrus* root. *Dr Dymock* speaking on this subject says I consider the root to bear very little resemblance to liquorice either as regards appearance or qualities as pointed out by *Dr Moodeen Sheriff* the leaves are by far the sweetest part of the plant and from them a tolerable extract may be made. An alkaline ash is prepared from the plant.

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§ **Special Opinions**—The root of the third variety as described by *Roxburgh* is used for gonorrhœa. A quantity equal to a drachm in weight is pounded and the expressed juice mixed with sugar candy (*Surgeon H McCulman M D Bombay*). At Poona *Safed Gunja* is considered the best variety and accordingly under this name *Glycyrrhiza glabra* is sold in the bazars. The root of *Abrus precatorius* appears to have fallen much out of use of late (*G M Woodrow Prof College of Science Poona*). An infusion of the roots is used for procuring abortion in Hosharpur District, Panjab (*W C Coldstream Esq Com missioner Hissar*).

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Further experience confirms the view that the root of this plant is not a substitute for liquorice and that the article sold in the bazars as Indian liquorice is not the root of *Abrus precatorius*. I would therefore strike out everything connecting liquorice with *Abrus* (*Deputy Sur*

Opinions of Medical Officers.

ABRUS
precatorius.

geon General G Bidie C.I.E Madras) The powdered root with ginger and other carminatives is much used for coughs including whooping cough Dose—5 to 7 grains A cold infusion of the root is also used in leucorrhœa (Narain Misser Hoshangabad Central Provinces)

Not equal to liquorice but a fair substitute used chiefly in the form of infusion $\frac{1}{2}$ oz of the root bark to 10 oz water dose one to two ounces (Apothecary Thomas Ward Madanapalle Cuddapah) I often use a decoction of bazar liquorice in cough mixtures and find it very useful especially in the bronchitis of children (Surgeon Major F F L Ratton M D Salem)

THE LEAVES —§ If the leaves are steeped in warm mustard oil and applied over the seat of pain in rheumatism much benefit will be derived (Surgeon W Wilson Bogra)

The leaves warmed over the fire are applied to painful swellings over which a little warm castor oil is first smeared In this way they are said to be antiphlogistic in their action (Hon Surgeon P Kinsley Chicacole Ganjam Madras) Juice of fresh leaves mixed with some bland oil and applied externally seems to relieve local pain (Surgeon Major Bunkabehari Gupta Puri)

THE SEEDS —In his Sanskrit Materia Medica Surgeon U C Dutt says the seeds are used internally in affections of the nervous system and externally in skin diseases ulcers affections of the hair They are pounded and made up with mercury sulphur *nim* seeds hemp leaves and cotton seeds &c

§ The seeds are used as a purgative but in large doses are an acrid poison giving rise to symptoms resembling those of cholera The poisonous property is generally believed to be in the red covering of the seed (Surgeon Major A S G Fayakar Arabia)

When boiled with milk it is said to have a very powerful tonic action on the nervous system Dose of the powder boiled with milk one to three grains The powder when administered internally uncooked acts as a strong purgative and emetic (Surgeon W Barren Bhuj Cutch Bombay)

The white seeds are made into confection with several other drugs and used as tonic A Vaid tells me that the roots are similarly used (Surgeon Major F Robb Ahmedabad) Used in granular chronic conjunctivitis causes slight inflammation and absorption of the granulation (Surgeon H D Masani Karachi)

If the colour of the seeds is sufficient to constitute a variety there are more than 10 varieties of *A. precatorius* some seeds are entirely black white yellow or rosy and such seeds are more used in medicine than those described by Dr Roxburgh as having an eye of a different colour Taken internally by women the seeds of *A. precatorius* disturb the uterine functions and prevent conception For the latter purpose 4 to 6 seeds are swallowed every day in 2 doses for several days after each menstruation The white and black seeds are preferable to those of other colours I am aware of one successful case under this treatment The white seeds again are considered deobstruent or repellant Rubbed up with water and applied to swellings they succeed in some slight cases (Hon Surgeon Moodeen Sheriff Khan Bahadur Madras)

I presume that this plant is the one referred to by Major Ramsay of the Bengal Police in his book Detective Foot prints Bengal 1874 81 London Army and Navy Co-operative Society 1882. He calls the plant *Korgani* his description at page 44 agrees The seed is used for killing cattle Consult the reference (Surgeon L Cameron Nuddea) "The powdered seeds are taken as snuff in cases of violent headache arising from cold (Mr T N Mukharji Calcutta) The boiled seeds are

MEDICINE

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Leaves
56Seeds
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60

**ABRUS
precatorius**

Opinions regarding the Gunja.

EMISTRY

61

said to possess powerful aphrodisiac properties (*Surgeon Major F M Honston Travancore and Civil Apothecary John Gomes Travandrum*)

The seeds rubbed down with a small quantity of water (paste) is used for contusions &c to reduce the inflammation (*Surgeon W A Lee Mangalore*)

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The root is a good substitute for imported liquorice The seeds are poisonous and used by the *chamars* for poisoning cattle they are poisonous when mixed with the blood but not so when taken internally I treated a case at the Bankipore Hospital who died with symptoms of nervous excitement On *post mortem* examination no trace of the drug could be detected only there was a suppurative spot with inflammation all around it and the brain was highly congested (*Asst Surgeon Bolly Chand Sen Calcutta*)

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Prescribed as a general tonic and mixed with milk and cardamoms natives use it as an aphrodisiac In large doses it is emetic A mixture consisting of vinegar 2 parts sugar 3 parts and lime juice 1 part acts as an antidote to the poison—dose 67 grains (*Surgeon F McConaghey Shahjahanpur*) The seeds mixed with the roots and coconut milk are given in hæmorrhoids according to **Rheede** (*Surgeon H W Hill Manbhum*)

The seeds when decorticated and finely ground are used for treatment of pannus cornea and for granular lids with good effect They cause a true purulent ophthalmia and in cases where too vigorously used in diphtheritic exudation on the conjunctiva In mild cases of pannus and granular lids the treatment need not be carried beyond the purulent stage But in severe cases diphtheritic exudation must be caused before good results are procured A 3 per cent solution prepared by steeping the decorticated seeds in cold water for 24 hours brushed over the reversed lids three times a day will cause purulent ophthalmia In bad cases a 5 per cent infusion is required Moderate ulceration of the cornea is not a contra indication for the use of this remedy on the other hand the ulceration speedily improves (*By a Surgeon*)

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Off Preparation—An extract of **Abrus** root is regarded as officinal in the Indian Pharmacopœia dose *ad libitum*

Description—The root is woody tortuous and much branched about $\frac{1}{4}$ inch in thickness Section not broken up by medullary rays into wedge shaped blocks as in the true liquorice Bark thin reddish brown wood yellowish white Odour when broken peculiar and disagreeable Taste at first bitter, then sweet

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Chemical Composition.—In 1882 Dr de Wecker directed attention to the fact that the **Abrus precatorius** seeds used in the form of a lotion were capable of producing purulent inflammation of the conjunctiva He advanced the theory that this was due to the presence of a bacillus and stated that if an infusion of the seeds be sterilized, it is no longer capable of exciting inflammation if the bacillus be cultivated separately it will set up the factitious ophthalmia That when inoculations were carried very far a transmission to the lymphatic glands took place causing suppuration and erysipelatous symptoms as well as a distinctly febrile condition (*Four Ph Soc*)

66

It has been observed by Dr Nicholson that **Abrus** seeds are sometimes found on prisoners in jail Sudden attacks of ophthalmia in jails may perhaps often be factitious The action of the **Abrus** seeds in establishing purulent inflammation is at all events well known According to Dr de Wecker the ophthalmia set up by **Abrus** seeds disappears in ten days or a fortnight without any therapeutic intervention or danger to the cornea and he therefore recommends a lotion prepared from 155 grains of the decorti

Rati Poison.

ABRUS
precatorius

CHEMISTRY

cated and powdered seeds macerated in 17 ounces of cold water for 24 hours and then filtered in the treatment of certain eye diseases in which it may be necessary to produce purulent conjunctive inflammation. The theory that this infusion of the seeds of *Abrus precatorius* owes its power of producing ophthalmia to the action of a bacillus has by this time no doubt been abandoned even by its first propounders Messrs de Wecker and Sattler. Warden and Waddell have conclusively proved that the Abrus poison or *abrin* is a proteid closely allied to ordinary albumen that it is insoluble, and is present not only in the seeds but also in the stem and root of the *Abrus precatorius*. They further show that *abrin* produces its poisonous effect when injected subcutaneously but not when ingested (*Practitioner XXXII 135 437*).

My attention has been drawn to some interesting information regarding the chemistry of this plant but too late unfortunately to be taken advantage of. See *The Lancet* July and August 1884.

§ It has been proved that the action is not as supposed due to a bacillus but to some peculiar chemical constituent not yet isolated see papers in *American Druggist* 1884 pp 103 and 105. An alcoholic dialysate of *Abrus* was found very active hence bacilli can certainly not be the cause (*Dr Charles Rice New York*).

Food—The seeds, known vulgarly as Crab's eyes are said to be used in Egypt as an article of food and are wholesome when boiled if eaten in any quantity however they produce violent headache.

When injected under the skin they are poisonous. Heat with moisture however destroys completely this poisonous principle hence when cooked they become inert or if simply eaten the heat and moisture of digestion destroys the poisonous property. A temperature of 100° C will destroy completely the activity of the poison.

Poison—Dr Warden experimenting with the poisonous property of the seeds found that half a seed rubbed down with a small quantity of water and injected into the thigh of a full grown cat produced fatal effects in 24 hours. He succeeded in isolating an acid which he called Abric Acid it proved to be non poisonous. While the seeds used in this manner are highly poisonous it is remarkable as stated above that when boiled they may be eaten.

Special Opinions—§ The seeds are used by sweepers and *chamars* to poison cattle. From the throat of a bullock suffering from symptoms of poisoning resembling narcotism I once extracted a bamboo containing bruised *ratak* seeds loosely tied with hair. The animal died the same day. Iron needles soaked in a paste made from the ground seeds are also used. I once extracted a black ball made of wax and *ratak* seeds from the vagina of a cow (*Asst Surgeon Bhagwan Dass Rawal Pindi*).

The seeds are powdered and made into a little cylinder called *sui* almost exactly resembling a silver nitrate point. A puncture is made in the skin and the *sui* pushed in. The animal soon becomes uneasy and if discovered and the *sui* cut out the animal may live. (*Surgeon Major C W Calthrop M D Morar*). The powdered seed is made up into a paste and formed into short sharp pieces (called *sui* or needles) used by cattle poisoners. The *sui* is inserted under the skin of the animal causing inflammation and death (*W C Coldstream Esq Commissioner, Hissar Panjáb*). The pulp of the seed made into small needles called *sutaris* is used for poisoning cattle in Behar. I gave evidence in a case of this nature before the Sessions Judge of Patna. (*Asst Surgeon Shub Chunder Basu Bankipur*).

Domestic Uses.—The small shining, red seeds *rati* or *ghungchi* are largely used by the Indian goldsmiths as weights each weighing about 1.75 grains. In the Panjáb they are regarded as of correct weight when

67

FOOD
Seeds
68POISON
Sul-
69

70

DOMESTIC.
Seeds
as a weight
71

The Abutilon, or Indian Mallow

DOMESTIC.

A Necklace

72

As Orna-
ments.

73

A Rosary

74

75

76

equal to about eight grains of *bansmath* rice (*Mr Coldstream*) It is stated that the famous *Koh-i nur* diamond was first weighed by the *rati* a word which, by some authors, is supposed to have given origin to the jewellers carat (*kirat*, ARAB.) The carat is the twenty fourth part of an ounce or $3\frac{1}{8}$ grains this approximately would be equal to two *rati* seeds The climber, with its open withered fruits exposing the scarlet *rati* (or crab's eye) seeds is twisted round leafy boughs to simulate the holly at Christmas time in English stations

The *rati* are also extensively used for necklaces, ornaments for the ears and to decorate small boxes baskets, &c The fact of their being used as rosaries doubtless suggested the specific name *precatorius*

Abrus precatorius, *Linn* var **melanospermus**, *L* (as in Voigt's Hort Sub Calc p 228)

Syn for *A pulchellus*, *Wall* which see under generic note

Absinthe—An intoxicating liquor largely consumed by the French prepared in Europe from one or two species of Wormwood but chiefly from *Artemisia Absinthium*, *Linn* which see

Abstergent—A term applied in Pharmacy to a substance such as Fuller's earth which has a cleansing property The Soap nut (*Sapindus Mukorossi*, *Gærtn*) is an excellent abstergent or detergent and so also are the pods of *Acacia concinna* See under "Soap Substitutes" for other natural abstergents

ABUTA, *Aubl*

77

Abuta rufescens, *Aubl* DC Prod Vol I 103

Said by O'Shaughnessy to be considered Ceylon as an excellent stomachic and used for the same purpose as Cissampelos The plant is a native of Cayenne and Guiana and if used in Ceylon must be imported

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ABUTILON, *Gærtn* Gen Pl I 204

A genus of herbs or under shrubs (belonging to the Natural Order MALVACEÆ) containing about 70 species all inhabitants of the tropical or sub tropical regions Leaves softly tomentose cordate angled or palmately lobed *B acteoles* none Staminal tube divided at the apex into numerous filaments Carpels 5 or more entire (i.e. not divided by a false partition) when ripe separating from the axis Styles as many as the carpels

The word Abutilon is said by some authors to be an ancient Greek name for the Mulberry tree and to be given to this genus in allusion to the resemblance of the foliage Dr Rice writes me however that the word does not occur in old Greek authors but appears to have been first used by Avicenna The members of this genus are annual or perennial low bushes growing gregariously and forming clumps in the jungles There are 10 or 12 Indian species most of which are very abundant in the plains and yield beautiful white fibres The flowers of *A esculentum*, a Brazilian species are edible The leaves of all contain a large quantity of mucilage and are used in the same manner as the Marsh mallow of Europe

The allied genera are readily separated from Abutilon by the number and position of the ovules In *Althæa* they are solitary, ascending in *Sida* solitary pendulous while in Abutilon there are two or more ovules in each carpel one ascending and another pendulous from the top and bottom of the carpel

The following are the more important Indian species of Abutilon —

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Abutilon asiaticum, *G Don* and **A. indicum**, *G Don* MALVACEÆ are two species so nearly allied botanically that from an economic point

A 70

Important Fibres, worthy of attention.

ABUTILON
Avicennæ

of view they may be regarded as one and the same. The former is characterised by having the upper surface of the leaf rugose, the under velvety, with the carpels scarcely longer than the calyx. The latter, by the leaves being covered on both surfaces with closely felted white down, the carpels being also longer than the calyx.

Abutilon asiaticum, G Don Fl Br Ind, I, 326

80

COUNTRY MALLOW

Syn—*SIDA ASIATICA* Linn belongs to the former species

Vern—*Kangahi* or *kanghi*; *jhampi*; *HIND* *Petari* *BENG* *Kangori*, *chakra dhenda* *Petari* *MAR* *Tutti* (or *tuthi nar*) *perun tutti* *TAM* *Tuttura benda* *nugu-benda chettu* *TEL*

A asiaticum, G Don is chiefly met with in Western India and Ceylon, while **A indicum, G Don** is widely distributed throughout tropical India to Prome Pegu and Ava (wanting in Malacca). They are annual or perennial bushes frequenting roadsides banks of rivers &c especially in the vicinity of villages. Their curious fruit consisting of a whorl of pretty carpels has apparently suggested many of the designs in jewellery made in Eastern India. They blossom and seed all the year and when not insect eaten their graceful velvety leaves contrast elegantly with their yellow flowers.

Fibre—The stems contain a good fibre suitable for cordage (See remarks under **A Avicennæ**). These exceedingly abundant wild plants deserve attention as paper yielding fibres.

For further particulars see **A indicum**

FIBRE
Stems
81

Abutilon Avicennæ, Gærtn Fl Br Ind I 327

82

INDIAN MALLOW AMERICAN JUTE

Syn—*SIDA ABUTILON* Willd in Roxb Fl

References—*Roxb Fl Ind Ed C B C 518* *Voigt s Hort Sub Calc* 114 *Christy New Comm Pl 33 34*

Habitat—A native of North West India Sind Kashmir and distributed to North Asia and westward to South Europe and North America. It is said to be also met with in Bengal but Roxburgh first reared it from seeds received from China under the name of *King ma*. In Bengal it would therefore seem to be introduced or met with in cultivation only.

Botanic Diagnosis—*Leaves* orbicular cordate with a long point. *Peduncles* solitary axillary shorter than the *petiole*. *Sepals* free or nearly so. *Petals* yellow hardly exceeding the sepals. *Carpels* 15 20 becoming ultimately divergent and much exceeding the sepals.

Properties and Uses—

Fibre—Considerable attention has of late years been directed to the fibre produced from this species in the United States vast quantities are being prepared over the region from Ohio to Missouri. "It is pronounced superior to Indian jute and finer than Manilla hemp. It takes readily any colour and its natural lustre displays more in the aniline dye than in any other—a great advantage over Indian jute which is antagonistic to cheap bleaching and dyeing. It is stated that an acre of ground will produce 5 tons of *Abutilon* stalks and about 20 per cent of pure fibre is obtained after preparation. Considered superior to jute fibre as imported the long fibre is fully equal in value to Calcutta prime jute and Philadelphia rope manufacturers have already offered to buy any quantity at the highest market price for jute (*Christy*). This is exceedingly important and points to the advisability of a thorough examination of this and other Indian species with special reference to their fibres. It is recom

FIBRE
Stems
83

**BUTILON
indicum**

The Indian Mallow—Medicine

mended to be sown broadcast, the yield from good soil being 4 tons an acre of dry stalks

84 Abutilon graveolens, W & A Fl Br Ind, I, 327

Syn—SIDA GRAVEOLENS Roxb SIDA HIRTA Lam DC Prod

Vern—Barkhanghi HIND and BENG

References—Roxb Fl Ind Ed C B C 518

Habitat.—North West Provinces Sindh Nilgiri Hills and Ceylon distributed to Beluchistan Java tropical Africa and Australia

Botanic Diagnosis—Whole plant covered with clammy pubescence and spreading hairs *Leaves* orbicular cordate acuminate *Peduncles* as long as the petioles *Carpels* 20 or more rounded and hairy not awned The whole plant has an unpleasant smell

Properties and Uses—

This is chiefly a native of the North West Provinces and Sind extending along the western side of India to the Nilgiri Hills and Ceylon Kurz says it is also met with in Pegu frequenting uncultivated places This species was first obtained by Dr Roxburgh from seeds sent him from Cawnpore From its prevalence in the North West Provinces and the fact that it contains a much larger proportion of mucilage than any of the preceding species this is most probably the plant which yields the Kangai medicine used in these Provinces It may be employed for the same purposes as the preceding the stems yielding fibre the leaves roots and seeds medicine

89 A. indicum G Don Fl Br Ind I 326 Wight Ic t 12

Syn—A ASIATICUM W & A non SIDA ASIATICA Linn SIDA INDICA Linn SIDA POPULIFOLIA Lam SIDA BELVERE L Her

Vern—Kanghi kanghani jhangri HIND Potari BENG Miru baha SAN TAI Masht ul ghoul deishar ARAB Darakhte shanah PERS etári fmadni Kangori kangori chakra bhenda BOMB and DUK Dabali GUJ Balby CUTCH Khápató SIND Petari túp kadí GOA Tutta uram MALAY Shrimudrigida KAN Tutti perun tutti TAM Tuttuwa benda nugu benda tuturi chettu TEL Anoda gaha, SINGH Bon kho-e bon khoye tha ma chók BURM The seeds are known as balby BOMB

References—Drury s U P 4 Roxb Fl Ind Ed C B C 518 Atkinson s N W P Gas X 724 791 Stewart s Pb Pl p 21 Dals and Gib s Bomb Fl 18

Habitat.—A small shrub common throughout the hotter parts of India

Botanic Diagnosis—*Leaves* cordate entire or toothed closely felted with white down on both surfaces *Sepals* ovate acute *Carpels* 15 20 when ripe longer than the calyx glabrescent truncate or shortly awned awns spreading *Flowers* yellow opening in the evening *Peduncles* longer than the petioles joined near the top

Properties and Uses—

Fibre—The STEMS contain a good fibre suitable for cordage (See remarks under A. Avicennae)

Medicine—The LEAVES yield a mucilaginous extract used as a demulcent

From the ROOTS an infusion is prepared and given in fevers as a cooling remedy said also to be useful in the treatment of leprosy

The SEEDS are considered laxative and demulcent and are given in the treatment of coughs They are generally known by the name of Balby especially in Western India they cost about R6 per maund The bark is astringent and valuable as a diuretic The bark roots

IBRE
Stems
85
DICINE
eaves
86
loots
87
seeds
88
89

IBRE.
leaves.
90
DICINE
eaves
91
loot.
92
seeds
93

| Indian Gum Arabic. | ACACIA. |
|--|----------------|
| <p>leaves, and seeds are used in native medicine, and said to be useful in chest affections. An infusion of the leaves or of the roots is prescribed in fevers as a cooling medicine (<i>Ansles</i>). The seeds are used as a laxative in piles. In Bombay they are supposed to be laxative and demulcent, and like the leaves are very mucilaginous. <i>A. indicum</i> and <i>A. asiaticum</i> are used indiscriminately, if not also one or two other species. A decoction of the bark, leaves, and seeds together has been long used by the Hindus on account of its mucilaginous and diuretic properties much in the same way as the Marsh mallow of Europe (<i>Dymock, Mat Med, Western India</i>).</p> | MEDICINE. |
| <p>'§ A decoction is used as a mouth wash in cases of toothache and tender gums. Boiled milk whisked with the fibrous twigs coagulates, the fluid obtained on decantation is by hakims regarded as efficacious in hæmorrhoids when given internally' (<i>Surgeon G. A. Emerson Calcutta</i>).</p> | 94 |
| <p>The seeds are reckoned aphrodisiac. The leaves are cooked and eaten in cases of bleeding piles. The infusion of root is useful in strangury and hæmaturia (<i>Surgeon Major D. R. Thompson M.D. C.I.E. Madras</i>). Dose half to 2 drachms laxative and demulcent invariably used in combination with other purgative medicines (<i>Surgeon W. Barren Bhuj Cutch Bombay</i>). A decoction of the leaves is used in gonorrhœa and chronic bronchitis (<i>§ Norman Chatrapore Ganjam</i>). A mucilaginous decoction used in gonorrhœa and inflammation of the bladder (<i>Surgeon J. Anderson Bijnor</i>). The seeds are burned on charcoal and the recta of children affected with thread worm are exposed to the smoke. It is said to be a very rapid and certain cure, but I have never tried it myself (<i>Surgeon Major C. W. Calthrop Morar</i>).</p> | 95 |
| <p>Abutilon muticum, G. Don Fl Br Ind I 327</p> | 96 |
| <p>Syn.—<i>SIDA TOMENTOSA</i> Roxb. <i>Fl Ind Ed C.B.C.</i> 518 <i>Dals & Gibs Bomb Fl</i> 18</p> | |
| <p>Habitat.—An erect annual native of rubbish heaps, road sides, hedges &c. where the soil is good, met with in the North West Provinces and Western Peninsula.</p> | FIBRE. Bark |
| <p>Fibre.—Yields a fibre</p> | 97 |
| <p>A. polyandrum, Schlecht Fl Br Ind, I 325 Atkinson, Gas N W P, X 791 Dals and Gibs, Bomb Fl, 17</p> | 98 |
| <p>Syn.—<i>SIDA POLYANDRA</i> Roxb. <i>Fl Ind Ed C.B.C.</i> 516</p> | |
| <p>Vern.—<i>Velas thuthi</i> TAM?</p> | |
| <p>Habitat.—A native of the North West Provinces, tropical Himálayas up to altitude 3 000 to 4 000 feet. Western Peninsula, Nilgiris and Ceylon.</p> | FIBRE Bark |
| <p>Fibre.—It yields a long silky fibre resembling hemp.</p> | 99 |
| <p>ACACIA, Willd Gen Pl, I, 594</p> | 100 |
| <p>A genus of spiny or prickly shrubs or trees belonging to the Natural Order LEGUMINOSÆ and constituting the most characteristic group of the Sub-Order MIMOSÆ. It comprises in all some 430 species of which the foliiferous are cosmopolitan to the tropics, and the phyllodineous (comprising two thirds of the genus) almost restricted to Australia. The genus is characterised by having small flowers aggregated into rounded or elongated heads. Each flower or rather floret has its calyx and corolla regular and valvate. The stamens are indefinite and free.</p> | |
| <p>In India there are 18 species, chiefly distributed throughout the plains, two species ascending the hills to altitude 5,000 feet. The following are those of economic interest.</p> | |

Indian Gum Arabic.

Acacia arabica, Willd Fl Br Ind, II, 293 LEGUMINOSÆ

INDIAN GUM ARABIC TREE

Syn —MIMOSA ARABICA Lamk ACACIA VERA Willd ; A NILOTICA Desf

Vern —*Babul babur babla kkar* HIND BENG PB *Vabbula, barbara* SANS (*Dr Rice says these are doubtfully Sanskrit words or only Sanskritised*) *Ummughilan* ARAB *Khari-mughilan* PERS *Karu velum karu-veylam kar vaila* (by Cleghorn) TAM *Tuma nella tuma nallatumma kara* (by Cleghorn) TEL *Gobli karryali* MYSORE, *Jali* KAN *Babhula kali kkar rama kati* BOMB *Baval* GUJ *Babbar babhula kalikkar* SIND *Babul* C P *Gabur* SÁNTAL *Babola* MAL (S P) *Hnan lon kyang* ? BURM (contributed by A M Buchanan) *Sant* AFRICA IN KANARESE *mara* (tree), *chukka* (bark) *chipo* (leaves) are often given as port fire *Jali mara* = *Jali* tree

References —Voigt Hort Sub Calc 262 Stewart Pb Pl 50 Brandis For Fl 180 Drury U Pl 4 Gamble Man Timb 151 Fluck & Hanb Pharmacog 1879 233 Bent & Trim Med Plants II 94 U S Dispens 15th Ed 11 Year Book Pharm 1873 52 1874 280 1881 191 and 1882 152 Atkinson Him Distts (X N W P Gas) 781 Gums and Resins p 7 Baden Powell Pb Prod I 345 364 and 471

Habitat —Panjáb to Behar Western Peninsula and Ceylon Cultivated throughout the greater part of India save in the moist humid regions on the coast and in the extreme north west beyond the Jhelum One of the commonest plants of the Deccan but except where planted it is rare in the Panch Mahals it covers most parts of Surat and Gujarat Is common in the Upper Godaverí and is the most abundant plant of the Shewan district Sind An experiment to introduce the tree into Kashmir failed It is also absent from Assam and the greater part of the warm moist districts of Eastern Bengal British Burma and Manipur It becomes smaller in stature on approaching the coast attaining its greatest prevalence and most prolific condition in lower and middle Sind It is not indigenous to the Panjáb although plentiful attaining a girth of 5 or 6 feet in the submontane districts nor is it indigenous to Madras although it grows plentifully near villages and on waste lands especially on black cotton soil Very common in East and South Mysore It prefers a dry to a moist soil and seems to avoid the influence of the sea The tree is never leafless but the fresh foliage appears in February to April (Brandis Stewart)

Botanic Diagnosis —An erect shrub or tree with straight spines Leaves composed of from 6-12 pinnæ and 20 to 40 leaflets Flowers in rounded heads axillary supported upon short peduncles with the bracts above the middle Pod stalked straight sub indehiscent persistently grey downy with sutures deeply indented between the seeds seeds 8-12

This species belongs to the series *Gummifera globifera* or arborescent Acacias with globular axillary flower heads and straight long spines This series contains the following species —

A arabica, *A eburnea*, *A Farnesiana*, *A Jacquemontii*, *A leucophloea*, and *A planifrons*, which compare

For series *Gummifera spicata* see *A. Catechu*, and for series *Vulgares* see *A. concinna*

Properties and Uses—

SYNOPSIS OF PRODUCTS AND ECONOMIC PARTS OF THE PLANT

1 It yields a GUM in India used by the calico printer and for other industrial purposes, as a medicine by the natives and to a certain extent as an indifferent substitute for true gum arabic In times of scarcity it also constitutes an important article of food

Babul Gum.

ACACIA
arabica.

2. THE BARK is largely used by the Indian tanners in the preparation of leather and also as a dye. It is a valuable astringent medicine, extensively used by the natives and in Indian European medical practice as a substitute for oak bark. It is also used to flavour native spirits.

3. THE POD has recently attracted much attention as a tanning material containing a high percentage of tannin and imparting a good and uniform colour to the leather. From the immature pods by expression and inspersion an extract was formerly prepared. This was known to the ancients as *Acacia vera succus* and was highly prized by the Greek medicinal writers. From them the virtues of this Acacia extract passed doubtless to the Arabs and at the present day a drug known as *akaka* or *akakia* (or *acacia*) is regularly imported into Bombay from Turkey and Persia and kept by all Mahomedan druggists in India.

4. THE LEAVES are used as a tan and dye they are often eaten and constitute an important fodder in times of scarcity.

5. THE TIMBER is highly valued because of its hardness and durability. One of the principal trees in the Panjab for the rearing of lac insects (see Lac).

THE GUM

Vern — *Babul ki gōnd kīkar* (or *kīkar*) *ki gōnd* HIND *Babla atā babla gōnd babul gōnd* BENG *Kālī kīkar ki gōnd* DUK in TAM *pishin* and in TEL and MAL *pasha* are added to the respective vernacular terms for the tree to denote the gum. According to **Moodeen Sheriff** *kāla barburā niryasam* is the Sanskrit for this substance. **Samghul** HINDI ARAB **Dr Rice** writes that *kāla barburā niryasam* is only a modern attempt to render in Sanskrit. It means the juice of the black *barburā* whatever the latter may be.

GUM
Babul
102

Dr Dymock says There appears to be no mention of Gum Arabic in Sanskrit works. The Arabic and Persian name *Samgh* : *Arabi* given to this gum is more correctly the name for the True Gum Arabic than for the Indian Gum Arabic which is sometimes called *babul gōnd*. Commercially the gum from *A. arabica* is known as Moroccan or Brown Barbary Gum or Mogador Gum—*Gum Gattie* according to **Atkinson**. The name Indian Gum Arabic must be carefully distinguished from the commercial term East Indian Gum Arabic. Many authors use these incorrectly as synonymous.

This gum is a tolerable substitute for the True Gum Arabic but the mucilage is weak and the red colour often objectionable. It exudes chiefly in March and April each tree yielding about 2 lbs. In the bazars it occurs in the form of irregular and broken tears agglutinated in masses each tear about half an inch in size and of a brown or red to light straw colour.

For the chemical composition of Gum Arabic see **A. Senegal**.

TRADE AND COMMERCE

External —The subject of the identification of the true Gum Arabic of Europe is one still involved in considerable obscurity. The term Gum Arabic is of course incorrect little or no gum ever having come from Arabia. Several species of *Acacia* yield gums belonging to the Arabic series and these mixed together or distinct from each other but more or less adulterated with foreign matter reach Europe and are by the dealers classed into geographical varieties to which according to their purity are attributed certain commercial values. The principal English supply is from Egypt France obtaining its gum from Senegal. The so-called East Indian gum which is exported from Bombay to England to the continent of Europe, and to America is first imported into Bombay from the Red Sea ports. Except as adulterating this so-called East Indian gum it is doubtful if

**ACACIA
arabica.****Manufacture and preparation of the Babul.****GUM**

any Arabic gum of Indian origin ever finds its way to Europe. The impurities of the East Indian gum are said to be chiefly a substance resembling Bassora (readily distinguished by its insolubility in water), and a resinous substance belonging to the turpentine series. It would seem that the subject of our Arabic gums has not hitherto obtained the attention which it deserves. The various species of **Acacia**, wild or under cultivation, should be critically examined and their respective gums carefully collected, the area under each and the present and prospective supply of gum accurately recorded. It would of course be of little importance to attempt to calculate the probable number of trees scattered here and there over the country near villages—the forest tracts or areas where gum yielding trees form the prevailing feature are those of importance. Were this to be done and a report published and forwarded to Europe along with a complete set of samples a future trade would for certain develop—a trade which would soon check the anomalous importation of African gum and become a new source of revenue to India and her people. When it is recollected that all the Egyptian and African species which yield the true Gum Arabic of European commerce are either wild in India or are extensively cultivated or naturalised it is remarkable that no effort should have been made on the part of India to compete with Egypt and Africa. The commercial gums known as MOROCCO, MOGADOR or BROWN BARBARY gums are derived from **A. arabica**, *Willd.* They are described as consisting of tears or broken pieces of a light dusky brown tint. When dry they are permeated by cracks and are very brittle. They are perfectly soluble in water. (For further information consult **A. Catechu** and True Gum Arabic under **A. Senegal**.)

Internal—While our Indian gums are little if at all exported to Europe *babul gond* constitutes an important article of internal trade. But even in this trade there is a great deal of uncertainty which a little careful investigation might easily enough remove. It seems probable that the finer qualities of *babul gond* sold in our bazars may prove to be Senegal gum or white sennar (the true commercial Gum Arabic) the confusion in calling *babul gum* Gum Arabic having arisen in all probability from the fact of the scientific name **Acacia arabica** having been given to this species. The *babul gond* or *kikar gond* of the bazars is rarely pure being mixed with mechanical impurities and adulterated with other gums. The following are the gums generally mixed with each other and sold as *babul gond*: the true Gum Arabic obtained in Sind from **A. Senegal** (the *khori* SIND or *kumta* RAJPUTANA) **A. Catechu** gum (the *khair*) **A. Farnesiana** (the Cassia or *Vilayati babul*) **A. lenticularis** (*khair*) **A. modesta**, (*phulahi*) and several gums obtained from various species of *Albizia*.

MANUFACTURES AND PREPARATIONS

Babul gond is extensively used by the calico-printers. For certain colours a mixture of this gum with that obtained from *Anogeissus latifolia*, the *dhawa* is regarded as most serviceable and this mixture is likewise used to stiffen dyed fabrics and to give them a polish. It is also said to be used extensively in precipitating the indigo fecula. With turmeric (*huldi*) dye the *Dhawa gond* is used alone while with madder the *babul gond* is regarded as most efficacious.

(For the medicinal uses and properties of this gum and for its value as an article of food, see the remarks under those sections.)

THE TAN

THE BARK (*babul ki chhal* HIND, or *kas* or *sak* in N W P) is a powerful astringent and is one of the tanning substances most extensively used in India. There seems no reason why this might not

**TAN
Bark
103**

The Babul—A Tan of much value.

ACACIA
arabica.

TAN

compete with the Australian wattle bark if once made properly known its cheapness, as compared with the wattle, would more than compensate for a slight inferiority in quality

It is obtained by felling the trees 8 to 10 years old and cutting them up into pieces $2\frac{1}{2}$ by 3 feet in length the bark being removed when green. To do this the logs are beaten until the bark is removable the wood being sold as fuel. The bark in appearance consists of reddish brown slabs hard and rough with longitudinal fissures the inner surface being smooth and fibrous. Recent experiments made by Mr W Evans, one of the best practical authorities upon tanning in his laboratory at Taunton have shown this bark to contain 18.95 per cent of a beautiful cream coloured tannin when precipitated with gelatin. There is at present no exportation of *babul* bark to speak of but there seems every chance of a future trade developing. Mr Christy in his *New Commercial Plants* suggests that the bark pods and twigs should be used in the preparation of a tanning extract which apparently he recommends should be prepared in India and in that condition instead of as bark the *babul* tan should be exported. In a correspondence with the Provincial Agricultural Department the Government of India obtained much new information regarding the prospects of a future trade in this bark. In that correspondence Mr J S Gamble Conservator of Forests Northern Division Madras suggested that if grown for its bark *Acacia arabica* would probably be found most profitable if treated in coppice and cut over every 8 to 10 years. It would therefore require to be planted close say $10' \times 10'$ or still better propagated by broadcast sowing the wood could at the time of cutting be also easily sold at good rates in any locality away from the large forests where *babul* is grown.

THE PODS (*babul séngri*) are also used as a tan imparting a buff colour to the leather. If it is desired to cultivate the tree on account of its pods Mr Gamble recommends that it should be planted at first 15 feet apart and thinned out to 30 feet. A proper amount of air and sun light is essentially necessary for the full development of the fruit. This would give about 48 trees an acre.

An enquiry has recently been received by the Revenue and Agricultural Department of the Government of India from the Berlin Leather Trades Association through Messrs Fischer & Co of Bombay regarding what appears to be the *babul* pods. The Association writes that a small pod known under the name of *blablab* (? *bablá* the Bengali for *Acacia arabica*) formerly imported from the East Indies and partly also from the African coast has of late years entirely dropped out of the market. On being boiled it gave a dull decoction of a light grey yellowish colour. This colour became evenly diffused and was specially serviceable for sheep skin. It is earnestly desired to recover again this tan and dye stuff. I have taken the liberty to publish the substance of this correspondence since by doing so this may lead to the resuscitation desired. There seems little doubt that the so-called *blablab* referred to by the Berlin Leather Trades Association is the pods of the common *babul*. It is chiefly as a leather dye stuff that the Berlin Association wishes to recover the pods. Speaking of these pods Mr Christy in a letter to the *Tropical Agriculturist* Vol 2 p 989, states that they had been submitted to a chemical examination and were found to contain 60 per cent of tannin. The seeds are worthless and should be rejected. He also adds that by means of this tanning agent a beautiful light-coloured leather was produced. *Valonia* yields only 25.2 per cent of tannin and sells for £18 per ton. When once the *babul* pods come into the market as a recognised tan, Mr Christy anticipates they will fetch £40 a ton. If this statement be correct it is remarkable that a large trade

Pods
104

**ACACIA
arabica.****The Babul—Dye, Fibre, Medicine****TAN**

should not already exist in *babul* pods and still more so that such a trade apparently did exist but has now died out **Mr Buck** in his *Dyes and Tans of the North West Provinces* says 'The babul pods are used for tanning in the villages of the Cawnpore district and when nothing better is obtainable the leaves are employed as a make shift But of the bark he says it is the commonest and most effective tanning agent' used in these Provinces

**Leaves
105**

THE LEAVES alone are in some parts of the country used as a tan but chiefly as a substitute for the bark By the native tanners in India the bark is regarded as a much more powerful tan than the pods—a fact somewhat at variance with **Mr Christy's** anticipations

THE DYE**DYE
Pods
106**

As a dye stuff the boiled pods are often used especially in the North West Provinces constituting the black colour known as *siyah bhura* this with a subsequent application of a solution of sulphate of iron changes the black into shades of grey ranging to dark brown giving origin to the colour known as *Agrai khaki* Both colours are fast but the iron is most objectionable In combination with the barks of **Acacia Catechu** and **Butea frondosa** rich brown colours are also produced The pods and bark with alum as the mordant yield dark brown shades approaching to black In Upper India the pods are largely used by the dyers both as a direct source of colour and as an accelerator to other dyes In addition to the local supply which in the warm dry regions of the central and northern tracts of India is very considerable large quantities are brought from the forests Kumaon alone sending some 30 cwts valued at Rs 400 The price in Calcutta of the dried pods is from 2 to 3 annas a lb

§ The bark furnishes a dye largely used by the natives (*Surgeon S H Browne M D Hoshangabad Central Provinces*)

THE FIBRE**FIBRE
Bark
107**

THE BARK of the slender twigs yields a fibre which is used in the Panjab for the manufacture of paper It is also made into coarse ropes

MEDICINAL PRODUCTS**MEDICINE
Gum
108**

The true Gum Acacia is used in the preparation of the mucilage the *Pharm Ind* says that the gum of **Feronia Elephantum**, *Corr* is a better substitute for this than the gum from **A arabica** Gum is used as a demulcent and along with water as a vehicle for bismuth, oxide of zinc or other insoluble substance and also in lozenges

109

§ I do not agree with this remark the gum of **Feronia Elephantum**, is much inferior in various respects to that of **A arabica** (*Deputy Surgeon General G Baidie M B C I E Madras*) "Gum Acacia is also administered to recently delivered women as a tonic (*Surgeon H McCalman M D Bombay*) The gum is largely used in the form of a mucilage in diarrhoea and dysentery' (*Bhagwan Das Rawal Pindi*) Some native hakims say the gum is very useful in diabetes mellitus as the gum is not converted into sugar The bark and seeds burnt and powdered are used as a tooth powder' (*Surgeon Emerson Calcutta*) The powdered gum is useful combined with quinine in fever cases complicated with diarrhoea and dysentery' (*Brigade Surgeon Shircore Moorshedabad*) The mucilage in its simple form used as an injection has been found to allay the irritation of gonorrhoea and to lessen the discharge. It has also been found to allay rectal irritation in the diarrhoea and dysentery of children when given as an injection" (*Peter Anderson Guntur Madras Presidency*)

Acacia arabica mucilage I have used in cases of cystitis with good effect.' (*Surgeon Major F F L Ratton M D, Salem*) An infusion

| The Babul—Opinions of Medical Officers. | ACACIA arabica |
|---|-------------------------------------|
| <p>or decoction of the bark is used as gargle for sore-throat and stomatitis. The juice of the tender leaves is dropped into the eye for epithora and conjunctivitis. The gum is fried in <i>ghí</i> and made into sweetmeat for the use of women in childbed. (<i>Surgeon Major F. Robb Ahmedabad</i>)</p> | MEDICINE. |
| <p>Decoction of bark useful in chronic dysentery and diarrhoea as an astringent enemata. Useful gargle in spongy bleeding gums and mercurial salivation. Excellent mucilage from gum used in gastro-intestinal irritation. (<i>Surgeon Shib Chunder Bhattacharya Chanda Centl Prov</i>)</p> | II0 |
| <p>THE BARK is a powerful astringent recommended to be made official. It occurs in coarse fibrous pieces of a deep reddish colour. It may be used in external applications as a substitute for oak galls. It has been found a valuable remedy in prolapsus ani as an external applicant in leucorrhœa and has been recommended as a poultice for ulcers attended with sanious discharge. (<i>Pharm Ind</i>) As a substitute for oak bark <i>babul</i> is now issued to the Government hospitals and dispensaries in India. I am informed that the powdered dry bark dusted over sores or ulcers on the lips of horses is one of the best cures for these troublesome affections. A similar powder is used in the Panjab in the treatment of snake bite.</p> | Bark III |
| <p>§ I have frequently used the decoction of Babla bark as a substitute for oak bark for vaginal injections. It might take the place of imported oak bark. (<i>Surgeon C H Foubert Daryling</i>)</p> | II2 |
| <p>In addition to the ordinary uses of the gum and the bark I have frequently used the decoction of the bark as an astringent injection in different forms of leucorrhœa and found it to be more efficacious and less irritating than the alum and zinc injection generally used. (<i>Doyal Chunder Shome</i>) Useful as a gargle in relaxed sore throat' (<i>Surgeon F. Anderson Bijnor</i>) The infusion is useful as an injection in whites. (<i>Surgeon Major G Y Hunter Karachi</i>)</p> | |
| <p>' Babul Bark } Mango } Water }</p> | 1½ oz each 20 oz |
| <p>Boil for half an hour, filter and make a gargle said to be used in mercurial salivation. (<i>Surgeon F. Parker M D Poona</i>) A decoction of the bark is used by women in menorrhagia and leucorrhœa and is said to be efficient. The decoction is also used in caries of the teeth as a mouth wash. The young leaves in doses of 2 drachms are used in gonorrhœa with good effect. (<i>Narain Misser Hoshangabad Central Provinces</i>)</p> | |
| <p>The bark of the <i>Acacia arabica</i>, combined with the bark of the Banyan tree (<i>Ficus bengalensis</i>), after being infused, has been frequently used by me as a gargle in relaxed sore throat with excellent effect. Strong infusion of the above barks has also been used locally in cases of excessive bleeding from hæmorrhoids with very good effect. The dissolved gum with bismuth is very effectual in checking diarrhoea arising from intestinal irritation. (<i>Honorary Surgeon Easton Alfred Morris Negapatam</i>)</p> | II3 |
| <p>THE DRIED PODS reduced to a powder are sometimes given internally as an astringent.</p> | Pods II4 |
| <p>§ The powder of the tender legumes of <i>A. arabica</i> is astringent and demulcent, and has a beneficial influence over diarrhoea and dysentery. Its usefulness is much enhanced by the combination of some preparation of opium. It is generally more useful for children than adults. (<i>Honorary Surgeon Moodeen Sheriff Khan Bahadur Madras</i>)</p> | |
| <p>AN EXTRACT prepared from the young pods of this and allied species constituted the famous <i>Akakia</i> of the ancient Greeks. This extract was at one time much extolled, and its virtues were doubtless ultimately made</p> | The extract <i>Akakia</i> II5 |

| ACACIA arabica. | The Babûl—Opinions of Medical Officers. |
|--|--|
| MEDICINE | <p>known to India through the Arabs At the present day it is largely imported into India from Turkey and Persia and under the name <i>akaka</i> or <i>akakia</i> or <i>akhâkhîyâ</i> (acacia) is sold by all Mahomedan druggists According to Dymock it should be heavy hard and have an agreeable odour small fragments held between the eye and the light should be of a bottle green colour when seen in bulk it appears black It is considered to be cold and dry, astringent styptic and tonic and is used internally and externally in relaxed conditions of the mucous membranes, also as a collyrium in purulent conjunctivitis and chronic congestion of the vessels of the conjunctiva Applied as a lotion it is said to improve the complexion With the white of an egg it is applied to burns and scalds Powdered it arrests hæmorrhage in short it is used in all cases in which an astringent is applicable</p> |
| Decoction from Bark 116 | <p>A DECOCTION of the bark mixed with milk according to Mr Baden Powell (<i>Panjab Products Vol I p 345</i>) is in Delhi and Lahore evaporated into the <i>akakia</i> juice The term <i>akakia</i> is apparently incorrectly applied to this decoction, but the preparation is nevertheless an interesting adaptation of the ancient <i>akakia</i> or <i>akhâkhîyâ</i> It is said to be made into dark flat cakes with a sweet astringent taste It is regarded as acting as a demulcent and astringent and is said to be prescribed in coughs There is probably some mistake regarding the source of these cakes It is difficult to see how they could be sweet if prepared from the bark unless sweetened through some action upon the milk</p> |
| 117 | <p>§ I have often used the decoction of the bark as an injection in chronic dysentery with relaxed state of the rectum when with tolerably healthy motions a little mucus is passed The injection reduces the quantity of the mucus, soothes the irritability and gives tone to the mucous membrane I have also used the decoction in acute congestion of throat with success (<i>Surgeon D Basu Furridpur</i>) The bark contains a large quantity of tannin a decoction of it as a local application is most useful in cases of prolapsus uteri and of prolapsus ani and in other uterine and vaginal affections of an asthenic nature' (<i>Brigade Surgeon S M Shircore Moorshedabad</i>) 'The decoction of the bark is used as an astringent in diarrhœa and dysentery also as an injection in gleet and leucorrhœa and as a wash for hæmorrhagic ulcers also as a gargle in affections of the mouth and throat The tender leaves are sometimes used in dysentery as well as in diarrhœa (<i>Brigade Surgeon J H Thornton B A M B Monghyr</i>) 'A decoction of the bark is used as an astringent gargle in ulcers of the mouth The tender growing tops rubbed into a paste with a little sugar and water is given morning and evening as a demulcent to allay irritation in acute gonorrhœa (<i>Surgeon Major Bankabehari Gupta Puri</i>)</p> |
| Leaves. 118 | <p>THE TENDER LEAVES beaten into a pulp are given in diarrhœa as an astringent (<i>U C Dutt</i>) Mixed with the leaves of the pomegranate this pulp is also given in gonorrhœa</p> |
| 119 | <p>§ The young leaves are beaten up with black pepper and sugar and given in hæmatemesis (<i>Surgeon Major C W Calthrop M D Morar</i>) 'The powdered gum is lightly fried in <i>ghî</i> and used as an aphrodisiac The tender leaves fried in <i>ghî</i>, are used as a poultice over the eyelid to remove chronic congestion of the conjunctiva The bark is said to possess antisyphilitic properties" (<i>Surgeon Major D R Thompson, M D C I E, Madras</i>) The tender leaves, bruised and mixed with human milk, is used in conjunctivitis as a poultice or the juice mixed with milk is dropped into the eye The burnt bark mixed with salt and burnt almond shell is used as a tooth powder in Southern India." (<i>Surgeon Major John Lancaster, M B, Chittore</i>)</p> |

| The Babul—Food, Fodder, Timber | ACACIA arabica. |
|---|--|
| FOOD | |
| <p>The gum is highly nutritious and to a limited extent forms an article of food largely so in times of scarcity in fact, there are few trees more valuable to the cultivator than the babul. It yields his most valuable timber while luxuriating on the poorest waste lands and even in seasons of drought it is evergreen. Its bark forms a useful domestic medicine and along with the leaves and pods it is also used in dyeing and tanning. The leaves are a never failing source of fodder, and the gum an article of food each tree yielding about 2 lbs. In times of scarcity even the ground bark mixed with the seeds of the <i>Sesamum orientale</i> may be used for food.</p> | <p>FOOD Gum 120</p> <p>Bark 121</p> |
| FODDER | |
| <p>The green pods with tender shoots and leaves are given as fodder to cattle sheep goats and camels, and are specially valuable for this purpose during a season of drought when other fodder fails. In the drought of 1877-78 the road side trees in the North West Provinces were denuded of leaves for this purpose and this resource saved numbers of cattle. In ordinary seasons goats are largely fed upon the pods hence in all probability the rapidity with which the plant becomes diffused over the country springing up self sown on the banks of tanks rubbish heaps and walls. It is remarkable that sheep and goats not only eat but eat greedily a substance which is stated to contain so much of tannin. Balfour in his <i>Cyclopædia</i> however says it is only the seed that is given to sheep but his statement is at variance with that of all other authors the whole pod being given.</p> | <p>FODDER Pods 122</p> <p>Seed 123</p> |
| THE TIMBER | |
| <p>Structure of the Wood—Sapwood large whitish heartwood pinkish white turning reddish brown on exposure hard mottled with dark streaks. It consists of darker and lighter coloured bands of an equal width. Weight about 54 lbs.</p> | <p>TIMBER 124</p> |
| <p>It is very durable if well seasoned. Used extensively for wheels well curbs sugar and oil presses rice pounders ploughshares agricultural implements and tool handles in fact for all purposes for which a bent hard wood is required. In Sind it is largely used for boat building rafters and for fuel also occasionally for railway sleepers. One of the most valuable timbers for tent pegs.</p> | <p>Implements 125</p> |
| <p>The lighter-coloured sapwood of this tree is subject to be attacked by white-ants the heartwood much less so if properly seasoned. A good tree will sell in the Panjáb for as much as ₹30 or more: one of the best trees for broad cast sowings in the reclamation of waste lands because independent of rain. It is said that seasoned wood will only float for a few days. The Sind and the Madras Railway Companies refuse to use babul as a fuel from an idea that the pyroligneous acid injures the boilers. It is however largely used for this purpose by railways in other parts of India.</p> | <p>Fuel 126</p> |
| DOMESTIC USES | |
| <p>The bark of the roots is used to flavour native spirits and to assist the fermentation of the sugar. The bark is also stated to be used as a substitute for soap. The green pods are made into ink. The young thorny twigs are universally used for temporary dry fences to protect certain crops, and large bundles of the boughs are used by the fishermen as decoys. In the rivers of Assam these decoys end in cone-shaped baskets placed on the margins of the streams sloping down water. Every now and then they are raised from the water, and the fish, unable to escape through the decoy in time, are caught in the basket or amongst the</p> | <p>DOMESTIC Spirits. 127 Bark. 128 Pods. 129 Dry Hedges 130</p> |

| ACACIA arabica | Domestic uses of, and re-afforestation with Babul |
|--|---|
| Fish Decoys I31 Fishing hooks I32 Tooth brushes I33 | <p>thorny twigs In the tanks and lakes of Bengal similar decoys are submerged and alongside of these or imbedded between passages in the decoy traps of various forms are placed The sharp spines are made into the common fishing hook used in Bengal A portion of the twig is removed along with the spine the string being tied to the hook so that the spine points upwards Young fresh twigs are in Bengal used as tooth brushes</p> <p>§ The bark is extensively used in the preparation of country liquor” (<i>Bhagwan Das Rawal Pindi</i>)</p> <p>The bark is largely used for the distillation of rum Before distillation takes place it is steeped in water with molasses for a few days For loose teeth and tender gums the young stems are used largely by the natives for rinsing the teeth daily (<i>Assistant Surgeon J N Dey Feypore</i>)</p> |
| I34 | <p style="text-align: center;">CULTIVATION AND RE AFFORESTATION</p> <p>The extended cultivation of this species and of the allied gum yielding Acacias cannot but be attended with the most beneficial results to the country As an agent to improve sterile tracts of country or to arrest the destructive development of the efflorescence known as <i>reh</i> the most sanguine expectations may be entertained It should not be cultivated longer than has been found necessary to neutralise the salt because <i>babul</i> is an exhaustive crop In fact the moment <i>babul</i> has taken a hold of the soil the improvement may be regarded as established and should the soil be desired for other purposes the <i>babul</i> should be early removed There are extensive tracts of country highly suited for the cultivation of the gum Acacias and tracts too where this crop would prove far more productive than the futile efforts which are now being spent upon them The extended cultivation of the <i>babul</i> as a hedge to protect the fields and roads would greatly help to avert the dangers of a season of temporary scarcity both to men and cattle <i>Oleghorn</i> says it is of rapid growth and requires no water flourishing in dry arid plains and especially in black cotton soil where other trees are rarely met with</p> <p>§ One of the best subjects for planting in poor soils or exposed situations During long periods of intense drought it continues to flourish (<i>J Cameron Esq Bangalore</i>) It is said that the seed collected from the litter of goats germinates more freely and such seed is sometimes collected for sowings If sown thick in a road well or ditch in the rains it will under favourable circumstances come up as a wood hedge It is one of the most useful trees for broadcast sowings the seed germinates so easily and it is so hardy and independent of rain In the drier districts it should be planted as a thick belt along all roads to form a roadside avenue There would then be a vast supply of fodder available when rain failed This is being attended to in this division (<i>W C Cold stream Esq C S Hissar Panjáb</i>)</p> <p>The seed is gathered in April and by the native cultivator it is coated with cow dung and kept in that condition until July when it is sown at once into the spot where it is intended the tree should be allowed to grow It requires no further care except to protect the young seedling from being browsed upon by animals <i>Stewart</i> states that in the upper parts of the Gangetic Doab it is raised by cuttings <i>Major Pitcher</i> Agricultural Secretary to the Chief Commissioner of Oudh writes me that the best mode of propagating <i>babul</i> is to fold sheep previously fed on <i>babul</i> seed on the field where it is desired to plant the trees or to carry the dung to the field and plough it in when the plants will spring up like corn He also informs me that <i>Dr Bonavia</i> tried an experiment with a number of trees to discover which could withstand repeated swamping All died except the <i>babul</i> which continues to flourish on the banks of the Gumti, where</p> |

Cutch or Catechu

ACACIA
CatechuRE AFFO-
RESTATION

they are annually flooded. The *babul* would therefore prove most useful upon embankments to break the force of water in storms or during floods.

Gamble writes that it is an extremely useful tree in the re-afforestation of waste lands being associated with *Albizia Lebbeck*, *Balanites aegyptiaca*, *Parkinsonia aculeata*, the tamarind *margosa* and wood apple. These plants constitute the most prevalent association of trees met with in the warmer parts of India. The *babul* is ready for barking in eight to ten years. It is then cut down and renewed by fresh seedlings or the ground after this season of repose and leaf manuring is brought under other forms of cultivation. A full sized tree eight to ten years old will yield half a ton of bark. The gum yielding property increases with age the gum exuding naturally from the bark or accelerated by artificial scars. Stewart mentions a tree at a Mussulman shrine close to Lahore said to be over 100 years old which is popularly reputed to have shed blood when sacrilegiously cut by the Sikhs.

Acacia Catechu, Willd Fl Br Ind II 295 Roxb Cor Pl, t 175

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This is the plant which yields—

CATECHU CUTCH CATECHU NIGRUM PEGU CATECHU Eng CA
CHORE, CACHOU Fr KATECHU Germ CATECU, CATEIN,
CALTO It CATECU Sp CATCH Port

Sometimes called *Terra Japonica* a name which more correctly means Gambier.

§ Perhaps it would be better not to call this the true catechu as the *C pallidum* is now the official variety in British Pharmacy (Deputy Surgeon General George Bidie M B C I E Madras). The name *Catechu pallidum* has always been given to Gambier and the word Catechu was originally applied to Cutch which is official in America' (G W)

Syn — *MIMOSA CATECHUOIDES* Roxb *ACACIA CATECHUOIDES* Wall A
POLYACANTHA Willd A SUNDRA Bedd

Vern — *Khair* or *khair babul katha* HIND DUK *Khayer kuth* BENG
Khayyar SANTAL *Khoira koir kat* ASS *Vôdalam vodala; karan galli bagô wodahor wodahalle* (by Cleghorn) (? *kasku katti*) *wothalay*
TAM *Podala manu kaviri sandra nala sandra* TEL *Khadrira*
SANS *Khoiru URIYA Kagli kagali, tare* (in MYSORE) KAN
Khaderi khaira khera BOMB MAR *Kher* SURAT BARODA GUJ ;
Khair C P *Rathihiri* SINGH *Sha* BURM

The khadrira tree is mentioned in the Vedas where it is used as a simile for strength &c (Dr Ch Rice New York)

References — *Brandis For Fl* 186, *Stewart Pb Pl* 52 *Kurz, For Fl*
Burm I 422 *Gamble Man Timb* 153 *Roxb, Fl Ind Ed C B C*
423 *Madden Jour Asiat Soc Beng vol XVII part I* p 563,
Royle s Ill 182 *Baden Powell Pb Prod* 345 *Atkinson Him Dists*
vol X M W P Gas, p 775 *Balfour s Cycl I, Spons Encycl*,
Bombay Gazetteer vols IV 24 VI 13 X 130 XI 71 72 415; XII
25 XIII 160 British Burma Gas I 128 134 415 C P Gas 118
503 Oudh Gas vol. I, p v

Habitat.—Common in most parts of India and Burma extending in the Sub-Himalayan tract westward to the Indus and eastward to Sikkim ascending to altitude 5 000 feet. Mr J W Oliver reports that trees 70 to 80 feet high with a girth of 8 to 9 feet, are not uncommon in the North Tharrawaddy Reserves. In Burma it grows in the dry forests all over the plains of Pegu rare in the savannah forests common in the northern part of the Irrawaddy (*Burm Gas I 128*). In the Central Provinces it is plentiful in the forests of Bilaspur Chanda and Raipur. It is remarkable that in Raipur the natives seem to be ignorant of its value, no attempt as far as is known having ever been made to extract the Catechu

ACACIA
Catechu

Catechu Gum

(*C P Gas* 419) In Gonda Oudh it is abundant, also in the forests of the Upper Godavery spreading through the forests of Chutia Nagpur to the North West Provinces. In the Bombay Presidency it is most abundant in the forests of Ahmedabad Broach the Panch Maháls Surat and Baroda. In Madras the tree is by no means uncommon but the natives appear to know nothing of its properties. It is also met with in some parts of Mysore where it is even common.

Botanic Diagnosis—A moderate sized deciduous tree with dark brown much cracked bark and short hooked spines in pairs. *Leaves* composed of from 40 to 80 pinnæ and 60 to 100 leaflets. *Flowers* white or pale yellow peduncled spikes in the axils of leaves *rachis* downy. *Corolla* 2 to 3 times the tomentose *calyx*. *Pod* straight strap-shaped narrow thin dark brown.

This belongs to the series *Gummiferæ spicatæ* or arborescent Acacias with spiked flower heads and short recurved spines (except *Latronum*) —

A *Catechu*, **A** *ferruginea*, **A** *Latronum*, **A** *lenticularis*, **A** *modesta*, **A** *Senegal*, **A** *Suma*, and **A** *Sundra* which see and compare with above diagnostic characters.

For series *Vulgares* see **A** *concinna*.

THE GUM

GUM
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This plant yields a pale yellow gum often occurring in tears one inch in diameter generally less than half an inch in size. It is sweet to the taste and soluble in water. It forms a strong mucilage and is a better substitute for true gum arabic than babul gum with which it is generally mixed and sold as *babul gond*. The tears are mostly bright coloured varying to dark amber. They occur chiefly in broken pieces very much resembling large brown sugar the fragments being cracked and granular.

A pure sample of *Khair gond* was in 1873 sent from Chánda in the Central Provinces to London for report and valuation. It was pronounced as ordinary gum arabic and valued at 20s to 25s a cwt. The Deputy Commissioner in sending the sample remarked that by a little care on the part of the merchant a large supply of gum equal in purity to the sample supplied, might easily enough be procured and that the ordinary mixed gum arabic of Chánda sold for about Rs 4 a cwt landed in Bombay. The cost of collecting the gum in the forests was put down at Rs 8 a maund (80 lb) carriage from forest to Bombay Rs 4 a maund and this gum might easily realise in London 20s i.e. twice what it cost landed at Bombay. In the Ahmedabad district and Gujarát this gum is largely collected as also *baval* gum by the Bhils and sold either for grain or money or eaten by the poorer classes (*Bomb Gas* IV 24).

History of Catechu Gum.—No fresh effort appears to have been made to bring this gum to the notice of Europe nor so to organise its collection that comparatively pure consignments might continuously find their way into the market. It is reported to be much superior to babul gum and it would seem a large trade might easily enough be established confidence in the supply however must be created before any extended trade is possible. Indian gums hold so low a position at present in the commercial world that they require to be freed from an undeserved stigma. To accomplish this the most likely course would be to collect authentic samples as types upon which in Europe and in India, all experiments, reports and administrative assistance or encouragement might be based. It must be borne in mind however that vernacular names of bazar products are most untrustworthy far more so than the knowledge which every uneducated native of India possesses in the plants of his district. Adulteration and substitution is practised very largely in India and in different districts, still more so in different provinces widely dissimilar products are

Catechu Gum.

ACACIA
Catechu

GUM.

sold under the same vernacular names. The type samples require, therefore to be collected from the individual plants and carefully examined both as to their physical appearance and chemical properties. So little is actually known regarding the subject of gums (even in Europe) that at present it is next to impossible to determine the botanical origin of a sample not accompanied with its geographical history and even then a mere commercial approximation is all that can be arrived at. To remove this ignorance the greatest care is necessary and it would be advisable to collect the type samples of each species of gum from one individual tree and if possible say during each of the great climatic seasons of the district—cold season, hot season and during the rains. Such collections would enable questions of specific variation to be determined. It would also remove all doubt as to identity were a flowering twig of the tree to be dried and preserved so as to admit of botanical determination together with a branch or log of the tree with gum exuding from it. The latter is necessary to afford some data by which the actual source or formation of each gum might be determined for it is possible that the same tree may yield more than one gum.

Within the past few years the plants which yield the true commercial gum arabic have been pretty well determined and it is important to note that all these are either wild or cultivated in India. To enable India to come into the field of competition with Egypt and Africa the merits of the Indian gums must first be made known by some accurate and reliable mode such as has been indicated. When the gums obtained from Indian trees have been chemically and botanically examined and commercially tested those most deserving of encouragement would be discovered and we should be able to indicate to the merchant the provinces and districts where these were most easily and plentifully procurable. We should be able also to supply the merchant with the tests by which he could protect himself against adulteration and admixture. The possession of such a knowledge would in time check fraudulent action and it would also act as the most powerful impulse to future progression for when freed of impurities there does not seem any reason why a large trade should not be established in Indian gums. Nothing is so fatal to the development of such a trade however as adulteration and admixture and it would seem that it is this that has prevented India from taking an important position as a gum supplying country. Dr Oooke, in his report on gums produced in India says: 'It is scarcely necessary to add that the gum must be unmixed. Two gums—it even may be that both are soluble—might not dissolve equally in water or freely coalesce this would be a disadvantage but when two or more gums are mixed of which one is insoluble in whole or in part the whole sample is greatly deteriorated and reduced to almost the rate of the insoluble admixture. Hence then commercially it is of importance that gum should be (1) entirely derived from the same species of tree (2) as light and uniform in colour as possible and (3) free from all foreign admixture.' In our Indian forests it frequently happens that two or more gum yielding trees are found growing together and the gums from these are indiscriminately collected together the mixture being often reduced to a powder and sold in that condition with the object of preventing detection of the admixture and adulteration with sand or other non gummy substances.

THE EXTRACT CATECHU OR CUTCH

Vern.—*Kat* or *Kath* *katthá* HIND *Kát* MAR *Katho* GUZ ; *Káshu-katta* *káshu* TÁM ; *Kánchu* TEL *Katti* *kashu* *katti* MAL ; *Kachu* KAN ; *Kaspu* CINGH

History of Catechu—At the present day, by far the most important

**ACACIA
Catechu****The Extract Catechu or Cutch****CUTCH**

product of **Acacia Catechu** is the resinous extract (Catechu) obtained by boiling down a decoction obtained from chips of the heartwood. The practice of preparing this extract has been handed down from remote periods. The Sanskrit authors mention the drug, and **Barbosa**, in his description of the East Indies published in 1514 mentions what is in all probability this drug under the name *Cacho*. He states that it was at that time exported from Cambay to Malacca. *Cacho* is apparently the Kanarese word *Kachu* now applied to it. It is in fact probable that the word Catechu is a modern Latin derivative from the South Indian name and that from South India the product was first exported. Some authors, however, say that it is derived from the Cochin Chinese word *Caycau*. One of the Tamil names for the plant is *Kati Kuti* or *Cate* and the second half of the word may have been derived from *Chuana* to drop or distil. Whatever may be the origin of the word Catechu it would save much ambiguity if it could be restricted to the extract from **Acacia Catechu** instead of being made popularly to include one or two other substances such as Gambier a word of Malayan origin signifying bitter and applied to a purely Malayan product (see **Uncaria Gambier**). It is quite true that both these astringents contain the same chemical properties but they are obtained from widely different plants and manufactured in countries separated from each other. In our *Trade and Navigation Returns* the exportation appears as Cutch and Gambier from which one would naturally infer that both Cutch (or Catechu) and Gambier were exported from India the relative proportions of which had not been determined. I am informed however by my friend Mr J E O'Connor that this practice is a remnant of the time when the Straits Settlements returns were published with those of India. At present therefore by Cutch and Gambier is meant in all probability chiefly Catechu a small amount only of Gambier is re-exported.

From the time **Barbosa** wrote in 1514 we have no further mention of this substance until 1574 when **Garcia de Orta** gave a complete account of the plant and the process of preparation of the extract describing it under its Tamil name *Cate* (*Kati* or *Kuti*). It was not however until the 17th century that Catechu attracted the attention of Europe. It was then supposed to be a natural earth and as it reached Europe by way of Japan (being simply re-exported from that island) it received the name of Terra Japonica. At this period or shortly after Gambier also found its way to Europe and was indiscriminately with Catechu called Terra Japonica. **Oleyer** exploded the mineral notion regarding Catechu and in 1685 republished **Garcia de Orta's** account of the preparation of the extract and declared it to be of Indian origin the best quality coming from Pegu and other sorts from Surat Malabar Bengal and Ceylon.

Catechu (from **Acacia Catechu**) was received as an official drug into the *London Pharmacopœia* of 1721. It was official in the *British Pharmacopœia* of 1864 but has since been discarded and Gambier retained both in Great Britain and India as the official form of the drug Catechu. In the *United States Pharmacopœia* Catechu (from **A Catechu**) is retained however as official and Gambier discarded.

Interesting Ethnological Facts connected with the Catechu Industry — Before passing to discuss the chemical properties and modes of preparation of Cutch (Kutch) and *Káth* the digression may be regarded as not altogether inappropriate to say something of the race of people who from time immemorial have made it their sole occupation to prepare this extract. A brief history of this nature it is thought may help to throw some light upon questions connected with the early history of the drug and may prove interesting to those who have not the opportunity of consulting the voluminous gazetteers and official records from which it is extracted. In his *Himalayan Districts* (which constitutes Vol X of *N W P Gaset*

| Ethnological Facts connected with the Catechu Industry | ACACIA Catechu, |
|--|--------------------|
| <p>teer) Mr Atkinson says "The men employed are of the <i>Dom</i> caste, and are called <i>Khasrís</i> from the vernacular name of the tree'</p> <p>In the <i>Bombay Gazetteer</i> Vol XIII an interesting account of the <i>Káthkarís</i> is given of which the following synopsis contains the most interesting features. It is stated that the <i>Káthkarís</i> or makers of <i>káth</i> are believed to have entered the district of <i>Thána</i> from the north and to have been originally settled in the <i>Gujarát Athávisi</i>, the present district of <i>Surat</i>. According to their story they are descended from the monkeys which the god <i>Ram</i> took with him in his expedition against the demon king of <i>Ceylon</i>. They are darker and slimmer than other forest tribes. They have no peculiar language of their own but in conversation they have a tendency to reduce words and shorten speech and uniformly endeavour to get rid of the personal not the tense inflections of the verbs. The women are strong and healthy and pass through child birth with little trouble or pain. They are said sometimes when at work in the fields during the rains to retire behind a rice bank and give birth to a child and after washing it in the cold water to put it under a teak leaf rain shade and go back to their work. They are divided into two sections—<i>Sons</i> or <i>Marathas</i> and <i>Dhors</i>. The former do not eat cow's flesh and are accordingly allowed to draw water from the village well. They are also more or less a settled tribe. Some of them still make <i>káth</i> or catechu but from the increase of forest conservancy the manufacture is nearly confined to private <i>inam</i> villages and to forests in Native States. When they go to the forests to make Catechu they hold their encampment sacred and let no one come near without giving warning. Before they begin their wood cutting they choose a tree smear it with red lead offer it a cocoanut and bowing before it ask it to bless their work. The Catechu is made by boiling the heart juice of the <i>khair</i> tree straining the water and letting the juice harden into cakes. The <i>Káthkarís</i> will never go in for regular cultivation they eat rats and monkeys and live chiefly upon jungle produce or by theft stealing from fields and barns.</p> <p>In the tenth volume of the <i>Bombay Gazetteer</i> p 48, it is further stated that the <i>Káthkarís</i> a wild forest tribe in the <i>Ratnagiri District</i> who subsist almost entirely by hunting now that their more legitimate occupation of preparing Catechu <i>káth</i> has been interfered with habitually kill and eat monkeys shooting them with bows and arrows. In order to approach within range they are obliged to have recourse to stratagem as the monkeys at once recognise them in their ordinary costume. The ruse usually adopted is for one of the best shots to put on a woman's robe <i>sári</i> under the ample folds of which he conceals his murderous weapons. Approaching the tree on which the monkeys are seated the disguised <i>shikári</i> affects the utmost unconcern and busies himself with the innocent occupation of picking up twigs and leaves. Thus disarming suspicion, he is enabled to get a sufficiently close shot to render success a certainty.</p> <p>In the villages of <i>Navágám</i> about 7 miles north east, <i>Gángadia</i>, 11 miles south and <i>Nelsa</i> about 9 miles south west of <i>Dohad</i> every year on the day after <i>Holi</i> (April) a ceremony called the <i>chul</i> or hearth takes place. In a trench seven feet by three and about three deep <i>kher</i> (<i>Mimosa Catechu</i>) logs are carefully and closely packed till they stand in a heap about two feet above ground. The pile is then set on fire and allowed to burn to the level of the ground. The village <i>Bhangia</i> or sweeper breaks a cocoanut kills a couple of fowls, and sprinkles a little liquor near the pile. Then after washing their feet, the sweeper and the village headman walk barefoot hurriedly across the fire. After this strangers come to fulfil vows and giving one anna and a half cocoanut to the sweeper and the other half cocoanut to the headman wash their feet and, turning to the left walk over the pile, the fire seems to cause none of</p> | CUTCH |

**ACACIA
Catechu.****Preparation and forms of****CUTCH.**

them any pain" (*Bombay Gazetteer III 310*) At the village of Chosala about 7 miles north of Dohad a stream runs into a cave, and on this spot an image of *Mahádev* under the name of *Kedáreshvar*, has been set up. The place is sacred to the Bhils.

Many other similar ceremonies and sacred practices might be mentioned showing that the preparation of Catechu dates back to the remotest antiquity. The tree is sacred to *Mangala* or *Kárttikeya* one of the Hosts of Heaven. It receives special worship and is often mentioned in the Vedas.

FORMS OF THE CATECHU EXTRACT**I39**

There are three substances all very similar in chemical composition, derived from this plant. (1) Dark Catechu or *Cutch* used for industrial purposes. (2) Indian Pale Catechu or *Kath* a crystalline substance eaten in *pán* or used medicinally by the Hindus prepared from the decoction. (3) Keersal a crystalline substance found imbedded in the wood.

**Cutch
I40**

I.—PREPARATION OF CATECHU OR CUTCH. The trees are regarded as mature when about a foot in diameter. They are then felled and cut up into blocks two to three feet in length. In some parts of the country the natives test whether the tree will pay to cut by making a small notch in its heartwood. Trees between 25 and 30 years old are regarded as best suited for the manufacture and are said to yield more or less *kath* according to the number of the white lines in the heartwood. (*Bombay Gazetteer VII p 35*) The bark and the outer white wood is removed and rejected. The red heartwood is then cut up into small chips (generally about a square inch in size). In *Báriya* Gujarát the trees are not felled but the branches lopped and the extract prepared from them and it is stated that in some parts of the country the unripe fruits and leaves are also used. The furnace in most frequent use is of a curious construction it is built over leaving a number of small openings into which the earthen pots are placed in which the chips are boiled down into a decoction. The process is somewhat varied in different parts of the country the departures however being in minor details. After being boiled the red liquid obtained is poured over fresh chips and boiled again and when a decoction of sufficient strength has been made this is poured either into larger earthen pots or, as in Pegu, into iron bowls and boiled down into the consistency of a black paste.

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In Baroda 'the men after removing all the sapwood and a little of the heartwood cut it into thin chips about a square inch in size. These chips are boiled in small earthen pots with water. When sufficiently charged with *káth* the water is poured into two pots and allowed to go on boiling. The infusion in the two pots is poured into a wooden trough one yard long and eighteen inches broad and a woman strains it through a piece of blanket about a foot square. Sitting on the ground she dips the blanket into the infusion stirs it about, and holding it as high as she can wrings it into the trough. This process goes on for about two hours after which the trough is covered with a lid of split bamboos and the sediment is allowed to subside. The water is then poured off and the *káth* cut into small cakes and left to dry. On account of the destruction it causes to trees, *káth* manufacture has been stopped in the Navsári forests" (*Bombay Gazetteer VII 35*) 'In *Báriya*, Gujarát, during February and the three following months, *káth* making gives employment to a large number of Kolis and Náikdás. Branches stripped of their bark are cut into small, three or four-inch, pieces and boiled in earthen pots till only a thick sticky decoction remains. A narrow pit five or six feet deep is dug and a basketful of the extract placed over the pit's mouth the water soaks into the earth, and the refuse remains in the basket, leaving the *káth* in the pit. The

the Extract Catechu

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extract is then taken out and dried on leaves in the sun" *Bombay Gas*, VI, 13)

In the *British Burma Gasetteer* the process is described as follows

Three men generally work together one cutting down the trees (*sha* or *Acacia Catechu*) and driving the buffaloes that drag them to the site of the furnace one clearing off the sapwood and cutting the heartwood into chips, and the third attending to the fires. The chips are put into four gallon cauldrons which are filled up with water and the whole is boiled for twelve hours. When the water is reduced to one half the chips are taken out and the liquid placed in large iron pans and again boiled and stirred till it attains the consistency of syrup the pans are then taken off the fire and the stirring continued till the mass is cool when it is taken out and spread on the leaves arranged in a wooden frame and left for the night in the morning it is dry and ready to be cut up into pieces for the market. The chips are boiled down twice but there is not much extracted by the second boiling. There was formerly no restriction on the felling of the trees and the supply was getting exhausted now no tree can be felled without permission and a fee of Rs 5 is charged for each cauldron used.

The following interesting correspondence which has been obligingly placed at my disposal by Dr Schlich Inspector General of Forests will be found to give important facts regarding the manufacture of Cutch as practised in Pegu. The Conservator of Forests in Oudh asks the Conservator of British Burma the following questions —

Enquiry — In my circle the season for manufacturing Cutch extends to only three months in the year and the rates levied here from catechu makers are 12 annas a pot capable of holding about 3 gallons of water or liquid substance. The rate has been raised this year from 9 to 12 annas per earthen pot which even seems to be a very low price compared with what you get in Pegu. I should feel much obliged if you would kindly give me the following information :—

- (1) The length of the season during which cutch is manufactured in your circle
- (2) The outturn per season per cauldron of 20 gallons
- (3) The process of manufacturing as conducted in Pegu
- (4) The price per maund of catechu on the spot
- (5) The distance of the market from the forests where the cutch is sold to retail dealers and others
- (6) What percentage of cutch is obtained from a maund of heart wood

Answer — (1) Cutch is manufactured in this circle from 1st June to 31st March but the months from December to March (inclusive) are those in which the manufacture is most energetically carried on. In April and May and in the drier parts in March even scarcity of water stops the work while in the rainy season carts cannot ply and boilers have difficulty in provisioning themselves and disposing of their cutch.

(2) The outturn of a cauldron per season depends on such a variety of circumstances—the duration of the season the quality of the trees their proximity to the boiling place and above all the working days of the party—that an average cannot be struck. It may be 2000 lbs only or it may reach and even exceed 6000 lbs, for a cauldron of 20 gallons (those in use have a capacity of 12 gallons).

"(3) Mr Carter Deputy Conservator, Tharrawaddy well describes the process of manufacture as follows —

For the working of one cauldron three men are necessary but if a larger number of cauldrons are employed there is some saving of labour. Of the three men one man is employed in felling the trees and dragging

**ACACIA
Catechu****Preparations and forms of****CUTCH**

them by means of cattle to the cutch boiling place. The second clears the logs of sapwood and cuts the heartwood into chips. The third attends to the fires and the boiling process. The chips are put into earthen pots, which are filled with as many chips as they will contain. Then water is poured in until the pots are nearly full. The pots (which have a capacity of about 3 gallons) are then placed on the fire and boiled for about 12 hours in which time the water is reduced to about one half the original quantity. For one cauldron 20 to 25 of these earthen pots are employed. The cauldron is nearly filled from these pots and when the extract in the cauldron is reduced to about one half the cauldron is again filled from the pots and this is repeated until the pots are emptied. The boiling process is generally accelerated by the employment of a large earthen pot which is set up near the cauldron and is filled at the same time as the cauldron and kept boiling. The extract from the small pots being constantly added as that in the larger pot is reduced. The cauldron is then filled from the large pot instead of from the small ones. The Burmans call this large pot the *Ye mo* or red water pot. The extract from the pots having all found its way into the cauldron the boiling is continued and the liquid is stirred until it attains the consistency of syrup and fills only about one fifth of the cauldron. The cauldron is then removed from the fire and stirred with a piece of wood shaped like a paddle for 4 hours or more by which time the mass has obtained a greater consistency and is cool enough to be handled. It is then placed in a mould like a brick mould and is left to cool. This generally happens at night, and by next morning the result is a brick like mass of cutch weighing 36 to 44 lbs.

'The stirring business which takes place after the cauldron is removed from the fire is more of a beating up and I have never been able to ascertain what the object or effect of the process is. Cooks differ too in the amount of beating up that is desirable some being satisfied with half an hour's application. The outturn of one cauldron of 12 gallons in 24 hours when properly worked is fairly constant at the figure given by Mr Carter.

(4) Cutch was worth last year R438 to R558 per maund (equivalent to R15, R20 and R25 per 100 viss) on the edge of the forest according to the distance from the Irrawaddy river or the railway.

(5) The above rates correspond to some 40, 25 and 15 miles from the markets on the railway and river where the price was R30 per 100 viss (365 lbs) or R658 per maund.

(6) Regarding the amount of cutch yielded by heartwood no reliable data are available. The yield has been stated at from 3 to 10 per cent in weight.

For practical purposes I believe a ton of timber in the round may be taken to yield 250 to 300 lbs of cutch.

By whatever process the Catechu is prepared, the final drying and hardening takes place by exposure to the sun and atmosphere.

Commercial Forms of Catechu—In the Dun (North-West Provinces) it is then thrown (a) into moulds of clay, forming small squarish pieces or (b) into moulds formed of leaves. In other parts of the country it is thrown upon a cloth covered with ashes, of cow-dung, and (c) either allowed to harden into irregular slabs or when soft, it is cut (d) into blocks by means of a string. In Pegu it is manufactured into (e) great masses a cwt. in weight. These blocks are composed of layer upon layer of catechu of succeeding preparations separated by leaves. As the block form enters commerce it is generally broken into (f) pieces which may be readily distinguished from the other forms through the presence of the dried leaves.

- I43 (a)
I44 (b)
I45 (c)
I46 (d)
I47 (e)

I48 (f)

| the Extract Catechu | ACACIA Catechu |
|---|---|
| <p>dividing the layers In Bombay it is described by Dr Hamilton as formed into (<i>g</i>) rounded balls of the size of an orange These are probably after preparations for in Thána it is made into (<i>h</i>) cakes</p> | <p>CUTCH. 149 (<i>g</i>) 150 (<i>h</i>)</p> |
| <p>Description of Commercial Catechu met with in Europe—It occurs in great masses surrounded by leaves or broken into small blocks, in balls, cubes or irregular shaped pieces In colour it is externally of a rusty brown internally a dirty orange to dark liver colour in some cases almost black in others port wine coloured It is inodorous with an astringent and bitter taste followed by a sense of sweetness It is brittle and breaks with a fracture more or less resinous and shining The pale form <i>kath</i> is grey coloured porous and under the microscope is seen to be composed of agglutinated masses of needle shaped crystals</p> | |
| <p>2 —THE CRYSTALLINE SUBSTANCE KNOWN AS <i>Kath</i> (in some parts of the country (Bombay) pronounced <i>Kath</i>) or the PALE CATECHU OF INDIA —<i>Kath</i> or Pale Catechu is the restricted name given in Northern India to a grey crystalline substance prepared from a concentrated decoction of A Catechu wood by placing in it a few twigs and allowing the decoction to cool The twigs are removed and the crystalline substance collected Whether the liquid is rejected or afterwards boiled down to produce a poor quality of dark catechu or cutch has not been ascertained As sold in the bazars this crystalline substance occurs either in irregular pieces or in square blocks similar to the dark orange-brown homogeneous cubes of catechu This is the substance eaten by the natives in their <i>pan</i> and which imparts with lime the red colour to the lips It is apparently never exported to Europe the name <i>Kath</i> while chiefly applied to it is in some parts of India erroneously applied to Cutch also <i>Kath</i> and Cutch have by Europeans been mistaken for the same substance but the former is much purer chemically than the latter and it may be owing to the fact of Cutch being the form exported to Europe that Catechu has lost the former position it held as an astringent medicine It seems probable that the preparation of <i>Kath</i> may be a secondary process from the Cutch since its direct preparation from the original decoction has only been observed at Kumaon although the substance is universally used in <i>pan</i> all over India This subject deserves to be thoroughly investigated and the merits of <i>Kath</i> and its process of preparation made known The dark and the pale forms of <i>Khadrá</i> were both well known to the Sanskrit writers but in later times they seem to have been confused with each other</p> | <p>Kath 151</p> |
| <p>The process of preparation of <i>Katha</i> or <i>Káth</i> is described by Madden One portion of the <i>Khairis</i> is constantly employed in cutting down the best trees and for these they have to search far in the jungles only those with an abundance of red heartwood will answer This is chopped into slices a few inches square Under two large sheds are the furnaces—shallow and with a slight convex clay roof pierced for twenty ordinary sized earthen pots This operation takes place in about an hour and a half The liquor resembles thin light port and the <i>kathá</i> crystallizes on leaves and twigs thrown into it for the purpose Each pot yields about a seer of an ashy white colour The work is carried on for twenty out of the twenty four hours by relays of women and children the men merely preparing the wood which after being exhausted, is made use of as fuel</p> | |
| <p>3 —KEERSAI OR KHERSAL —From the wood of <i>Acacia Catechu</i> is occasionally obtained a pale crystalline substance known as <i>Khersál</i> The woodmen when cutting up the timber for fuel sometimes come across this substance and carefully collect it since it is much valued as a medicine by the Hindus, and fetches a high price Dr Dymock (<i>Mat Med</i></p> | <p>Keersal. 152</p> |

**ACACIA
Catechu****The Chemistry of Catechu****CUTCH**

Western Ind 232) says of it Keersal or catechuic acid is obtained from cavities in the wood and occurs in small irregular fragments like little bits of very pale catechu mixed with chips of reddish wood In the forests near Báriya Gujarát this substance is collected and is regarded as a valuable cure for coughs' (*Bom Gas VI* 13)

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§ Cutch is in large irregular cakes the characteristic squares are Gambier There are five kinds of Catechu in the Indian markets —

- (a) Kath in irregular fragments eaten with pan
- (b) Cutch of commerce in large irregular cakes soft internally
- (c) Cutch from Singapore in lozenges almost colourless
- (d) Gambier in characteristic squares
- (e) Areca nut cutch rarely met with (*Surgeon Major W Dymock Bombay*)

CHEMICAL COMPOSITION**154**

References — *Fluck & Hanb Pharmacog* 1879 243 *U S Dispens* 15th Ed 379 *Dymock's Mat Med of W Ind* 232 *Benil & Trim Med Pl II* 95 *Crooke's Dyeing and Colico Printing* 490 98 *Ffti Monatsh Chem II* 547 and *Liebig's Ann* 186 p 327 *Liebermann and Tauchert Ber der deutsch Chem Ges XIII* 694 *Nees von Esenbeck Ann der Chem und Pharm I* 343 *Zwenger Ann der Chem und Pharm XXXVII* 320 *Hagen Ann der Chem und Pharm XXXVII* 336 *Van Delben and Kraut Ann der Chem und Pharm CXXXVIII* 283 *Schützenberger and Rack Bullet Soc Chimiq de Paris* 1865 p 5 *Meyer Jour de Pharm* 1870 p 479 *Watt's Dict Chem I* 816 *Gmelin's Chem XV* (1862) 515 *Hist des Plantes (Monogr des Rosacées* 1869) I 415 *Year Book of Pharm* 1881 p 61 and 1882 p 84

§ Catechu contains a variety of tannic acid called *Mimotannic acid* which is soluble in water and *Catechu* or *Catechuic acid* which is insoluble *Mimotannic acid* differs from tannic acid in yielding a greenish grey precipitate with ferric chloride and by not producing pyrogallic acid when heated The destructive distillation of Cutch yields *Pyrocatechin* *Quercetine* is stated to be contained in Cutch This principle is the yellow crystallizable substance to which the bark of *Quercus tinctoria*, *Oliver* owes its colour' (*Dr C F Hislop Warden*)

The chemistry of the Catechus has occupied the attention of chemists for some time back but as yet the views and conclusions arrived at are somewhat conflicting and the subject may be regarded as still involved in considerable obscurity The brief chemical note (above) which my friend *Dr Warden* has supplied may be regarded as an abstract of all that is known In his *Science Papers* *D Hanbury* suggests that the process by which the various kinds of Cutch Catechu and Gambier are obtained should be carefully studied by persons who have the opportunity of doing so on the spot that the trees yielding each of the forms of these substances should be accurately recorded for he adds we wish to identify the trees with the respective extracts It would seem that our ignorance upon these important points may have much to do with the conflicting chemical results which at present exist regarding the composition of Cutch There are at least two if not three distinct products obtained from each of the Cutch yielding trees and it is just probable these may have been experimented upon indiscriminately by the chemists of Europe It would be but in keeping with other instances of two or more species (still more so of members of different natural orders) yielding approximately the same product to find that the trees which afford the Cutch of commerce produce substances chemically dissimilar Some such explanation may be found in the future to account for a certain number of the conflicting opinions which at present exist regarding the chemical composition of Cutch and its derivatives A similar example may be mentioned in the fact that *Aconitum*

The Chemistry of Catechu

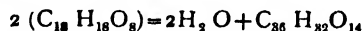
ACACIA
Catechu

Napellus yields a different alkaloid from **A. ferox**, although both species have hitherto been used in the preparation of Aconitia.

Pegu Catechu when immersed in cold water turns whitish softens and disintegrates a small proportion of it dissolving and forming a deep brown solution. The insoluble part is Catechin in minute acicular crystals (*Fluck and Hanb Pharmacog* 243). When the crude Cutch of commerce is subjected to a dry heat of 110° or 100° in an atmosphere of hydrogen it fuses and becomes transparent losing 4 to 5 per cent of its weight. It melts at 140° without further loss of water. On ignition there is left 3 to 4 per cent of ash. If pure it should be completely soluble in boiling hot water the solution precipitating the insoluble crystals of catechuic acid on cooling. Ether extracts from Cutch its catechin or catechuic acid so that by precipitation from a hot solution or by means of ether this substance may be separated for chemical or industrial purposes.

In addition to catechin Cutch contains however other two substances viz. Mimotannic acid and a gummy extractive principle. Mimotannic acid is soluble in cold water and by simple maceration may therefore be removed from Cutch. The solution will be observed to be of a thick chocolate colour. If heated to the boiling point it is rendered quite transparent becoming turbid on cooling. With this solution ferric chloride gives a dark green precipitate which will immediately change into purple on the addition of cold water or of an alkali.

Catechuic and Mimotannic acids are present in Cutch in about equal proportions. The effect of heat upon Cutch and its compounds is most important and as pointed out by **Etti** the chemical changes effected by heat afford the most likely explanation of the discordance of authors as to the formula for Catechin. According to **Liebermann** confirmed by **Etti** re-examination of the substance the formula for Catechuic acid or Catechin is $C_{18}H_{16}O_8$. If a piece of Cutch be first heated in a crucible and then macerated it will be found to be completely soluble in cold water. This is explained by **Etti** as due to the formation of soluble anhydrides from Catechin thus



The compound thus produced is known as *Catechu tannic acid* and is completely soluble in cold water. By a further loss of water at 190° 200° this becomes $C_{36}H_{30}O_{18}$. Under the influence of heat the anhydride that is first formed is $C_{36}H_{34}O_{18}$ an insoluble brownish red amorphous powder a substance soluble in alcohol and precipitated in crystals by lime-water. These compounds if formed in varying proportions in a piece of Catechu would greatly tend to produce conflicting chemical formulæ in the results of different experiments and a piece of Catechu which is found to be completely soluble in cold water should be regarded as inferior in quality (injured through heat) and most probably adulterated by the trader.

For some time **Gautier** regarded the Catechin of Gambier as quite distinct from that obtained from Catechu but in his more recent publications he admits them as identical. He now corrects his formula $C_{19}H_{14}O_8$ which he published as expressing Catechin (adopted in *Fluck and Hanb Pharmacog*) into $C_{19}H_{20}O_8$ and suggests for this compound the name of *Methylcatechin*.

The soluble Catechu tannic compounds constitute the active astringent principle of the drug and the tanning and dyeing property for which it justly holds so high a position for industrial purposes.

Preparation of Pure Catechin.—**Etti** directs that Catechu should be dissolved in about eight times its own weight of boiling water and the liquid after being strained through a cloth should be set aside for some days until the insoluble Catechin subsides. This should then be collected and

CUTCH

Catechuic
Acid.
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Mimotannic
Acid.
156

Gummy
Principle.
157

Catechu
tannic Acid
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ACACIA
Catechu

Adulteration and detection of

CUTCH

placed under a screw press being thereafter dissolved in a sufficient amount of dilute alcohol and the filtered solution shaken up in ether. The ether is next removed by distillation and the crystals obtained washed repeatedly in pure distilled cold water. It is then found to exist in the form of almost colourless crystals.

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Adulteration and Detection of Catechu — Meyer regards ether as the best reagent for this purpose. Whether it has been partially heated or not the whole of the Catechu tannic compounds may be abstracted from a given weight of pulverised Cutch by repeated treatment with ether about 53 per cent of the original weight being thus removed. The dried residue should thus weigh about 47 per cent the excess over this being adulterants. The chief substances used for adulteration are sand, clay, sugar, starch and dried blood. On ignition pure Cutch should leave a residue of 3 to 4 per cent. It should be completely soluble in boiling hot water if soluble in cold water it may be suspected of impurities or of having been injured by heat.

TRADE FORMS OF CUTCH OR CATECHU

From
Burma
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(a) *Burma* — It is largely prepared at Pegu in the districts of Prome and Thayetmo. It is in fact next to teak wood, the most valuable product of the forests of Burma. Dr Brandis in his Forest Administration Report for 1875-76 says that more than half of the Catechu exported comes from territories beyond the frontier of Assam and British Burma. The total number of trees felled during the year 1869-70 is stated to have been 284,198 in Pegu. The total earnings of a cutch maker in a good season is about Rs 70. The Pegu season is from November to March, very little is made from July to October and hardly any from April to May. (*Official Correspondence with the Government of India*) Pegu Catechu as this form is commercially known is in the London market regarded as the most valuable and according to *Spon's Encycl* p 1983 it fetches 21s to 42s a cwt but according to quotations published by the *Tropical Agriculturist* for 1882-83 the market value for it is 25s to 37s a cwt. The manufacture of Pegu Cutch in the year 1869-70 afforded in the Prome and Thayetmo districts alone, employment for 4,000 and with their families a total population of about 16,000 persons yielding an article of commerce worth on the spot about three lakhs of rupees. (*Indian Agriculturist* November 1882)

Bengal
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(b) Next in importance is placed the so-called Bengal Catechu. This with the exception of the supply from Chutia Nagpur seems to come chiefly from Nepal, the Terai forests of the North West Provinces, Oudh and of Behar. The Kumaon form seems to be entirely *Kath* while in the Dun forests and from the Keri Pass Mr Buck reports that Cutch is made in these forests into cubes and cakes. A most important trade exists in Cutch between Gonda and Calcutta. Dr McOann in his *Dyes and Tans of Bengal* compiled from the correspondence and records of the Bengal Economic Museum reports that about 1,000 maunds of Catechu is annually consigned from Hazaribagh in Chutia Nagpur to Calcutta where it sells at from Rs 8 to Rs 12 a maund. He also states that the local price is from Rs 5 to Rs 7 a maund while Dr Schlich says it is sold in the bazars of Chutia Nagpur at Rs 8 per maund. It may be here remarked that Dr McOann seems to have attached too great importance to the consumption of Gambier, for he informs us that the imports are nearly altogether Gambier which is imported for making *pán*. None of this is re-exported except a small quantity to the Mauritius &c for the *pán* of the Hindu coolies there. (*Dyes and Tans of Bengal* p 129) The question of the

Chutia
Nagpur
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| Commercial Forms of Catechu | ACACIA Catechu |
|--|--|
| <p>imports and exports under the heading of Cutch and Gambier to and from Bengal is certainly obscure but it is probable the exports which are very considerable relative to the entire industry are chiefly Cutch. The imports include the Cutch coasting trade principally from Burma (equal to more than half the entire industry) and a comparatively small quantity of Gambier imported from the Straits Settlements and consumed in India as the officinal form of the drug Catechu only a very small amount of this imported article is eaten in <i>pan</i>. Nearly the whole of the Cutch imported into Calcutta from Rangoon is re-exported to the United States where it is largely used as a brown dye and as a drug. It seems probable also that a considerable quantity of the imported Catechu is the product of Areca Catechu, re-exported as the true article. In the Calcutta bazars four kinds are said to be sold (a) <i>Belguti</i> 4d a pound (b) <i>Pegu</i> 6d a pound (c) <i>Ganti</i> 5d a pound and (d) <i>Fanakpur</i> 5½d a pound (<i>Amst Exhib Cat T N Mukharji</i>). Bengal or Calcutta Cutch fetches on an average from 20s to 30s in the London market. On application to Calcutta for samples of the above I received from <i>Babu T N Mukharji</i> the following 1st <i>Papri</i> a sample of Gambier in cubes and <i>Fanakpuri</i> apparently a sample of the so-called red Cutch of Upper Burma. This sample is pale pink brown in irregular masses with fragments of wood. It has the colour and texture of Gambier but does not exist in cubes. 3rd <i>Pegu</i> irregular pieces marked with leaves dark glassy brown. This is unmistakably Cutch. 4th <i>Tele</i> irregular masses yellow on the outside glassy brown within—Cutch. 5th <i>Belguti</i> rounded pieces marked with leaves uniformly brown black—Cutch. There would thus appear to be very considerable variations in the supply met with in the Calcutta market but there seems no doubt that a certain amount of Gambier is regularly sold as Cutch the sample called <i>Papri</i> is most distinctly Gambier and appears to be the Singapore article it occurs in the characteristic regular cubes.</p> <p>(c) Bombay Cutch in the <i>U S Dispensatory 15th Ed</i> is said to yield a higher percentage of tannin than Bengal Cutch but it is commercially almost unknown outside the Presidency. Birdwood describes four forms of it—</p> <ol style="list-style-type: none"> (1) Kauchu of Dharwar—flat round cakes two inches in diameter and one thick dark brown in colour and preserved in <i>bajri</i> husks (2) South Konkan covered with paddy husks (3) Khandesh in angular grains pale earthy brown internally darker externally (4) Surat in irregular lumps from the size of a hazel nut to a walnut <p>Dr Dymock gives the local value of the Surat Cutch as ₹20 per maund of 37½ lbs. This is the fine <i>kath</i> used with <i>pan supari</i> common <i>kath</i> is from 4½ to 5 rupees a maund.</p> <p>(d) The Cutch of Madras is in all probability purely the product of Areca Catechu. Dr Moodeen Sheriff says that the natives of Madras do not know that Acacia Catechu yields Cutch although the tree is common. Up to 5th August 1875 imported Cutch and Gambier was subject to a duty of 7½ per cent after that date the duty was reduced to 5 per cent and on the 9th March 1882 removed altogether.</p> | <p>CUTCH</p> <p>From Calcutta. I64 (a) I65 (b) I66 (c) I67 (d)</p> <p>Bombay I68</p> <p>Dharwar I69 Konkan I70 Khandesh. I71 Surat I72</p> <p>Madras. I73</p> <p>I74</p> |

TRADE RETURNS OF CATECHU

* Cutch is exported in mats bags or boxes the following table gives

* This presumes that the exports which appear in the *Trade and Navigation Returns* under the heading of Cutch and Gambier mean chiefly Cutch

**ACACIA
Catechu****Trade Returns of Catechu.****CUTCH**

the total exports of this important substance from India for the past five years —

| YEARS | Weight in Cwt | Value in Rupees |
|---------|------------------|--------------------|
| 1879-80 | 222 123 | 28 13 994 |
| 1880-81 | 316 077 | 42 22 527 |
| 1881-82 | 198 897 | 25 80 840 |
| 1882-83 | 246 506 | 30 52 434 |
| 1883-84 | 302 302 | 35 32 000 |

Of these amounts the following are the exports from Bengal and British Burma respectively —

| YEARS | Bengal | British Burma |
|---------|--------|---------------|
| 1879-80 | 67 757 | 154 290 |
| 1880-81 | 99 155 | 216 678 |
| 1881-82 | 57 747 | 141 013 |
| 1882-83 | 12 131 | 200 780 |
| 1883-84 | 68 885 | 230 005 |

The following analysis of the exports of Cutch shows the Provinces from which shipped and the countries to which consigned for the year ending 31st March 1884 —

| Presidency from which exported | Weight in Cwt | Value in Rupees | Country to which ex ported | Weight in Cwt | Value in Rupees |
|-----------------------------------|------------------|--------------------|----------------------------------|------------------|--------------------|
| Bengal | 68 885 | 9 15 504 | U Kingdom | 121 898 | 13 43 789 |
| Bombay | 3 263 | 33 582 | Egypt | 51 284 | 5 82 814 |
| Madras | 149 | 2 814 | St Helena | 33 020 | 3 89 920 |
| British Burma | 230 005 | 25 80 100 | U States | 67 566 | 9 01 513 |
| | | | Straits | 21 887 | 2 33 503 |
| | | | O Countries | 6 647 | 80 461 |
| TOTAL | 302 302 | 35 32 000 | TOTAL | 302 302 | 35 32 000 |

THE DYE

A solution of Catechu is by the action of lime or of alum changed into a dull red colour which constitutes a fairly good dye and is used for that purpose in some parts of India the extract may be used or the heartwood broken up and boiled with the lime With salts of copper and salammoniac Catechu gives a permanent bronze brown, much

| Catechu as a Dye, Tan, Fibre. | ACACIA Catechu |
|--|--|
| <p>used by the calico printers of India. This colour is deepened by the use of perchloride of tin with the addition of copper nitrate. In Dinajpur the red expectionation from chewing the <i>pán</i> is preserved and used as an auxilliary in dyeing eri silk. Dr McOann in his <i>Dyes and Tans of Bengal</i> mentions a dye combination and Mr Buck in his <i>Dyes of the North West Provinces</i> adds several others in most of which lime constitutes the metallic agent. The rationale of these dyes lies in the fact that, under the influence of oxidising agents (chiefly metallic salts) the soluble Catechu compounds are converted into insoluble and thus permanent dyes. By the calico printers of Upper India 2 lbs of Catechu are boiled in 3 gallons of water. To this solution is added 1 lb of shell lime and the mixture set aside for 12 hours. The surface coloured liquid is skimmed off and preserved as the printing standard. In this case the oxidisation has taken place or nearly so before the colour is printed on the fabric. In Europe this is never done the dye solution containing soluble Catechin and Gum is printed on the fabric and the oxidisation accomplished within the tissue. This is a much more effectual and permanent process. The dyed fabric would in time become oxidised by exposure to the air but the process is completed more rapidly by exposing the fabric to steam or much more expeditiously by the still more modern process of passing it through a solution of bichromate of potash. The oxy salts of copper along with salammoniac are also sometimes used for this purpose and at one time enjoyed a high reputation. Milk of lime is selected as the oxy salt when the colours employed in the prints such as blue are naturally fixed by that agent.</p> <p>There are several standards adopted by the European calico printer containing Catechu of which the following are the more important.</p> <p>BROWN STANDARD—Water 50 gallons Catechu 200 lbs. Boil for six hours add acetic acid 4½ gallons and make up to 50 gallons by adding water. Allow to stand for two days thereafter decant the clear solution heat to 54 °C and add salammoniac 66 lbs. dissolve and allow to settle for 48 hours. Decant the clear portion and thicken with 4 lbs of gum Senegal per gallon.</p> <p>MADDER BROWN STANDARD to resist heavy purple colours—Catechu ½ lb salammoniac ¼ lb lime-juice at 8 °Tw 1 quart nitrate of copper at 8 °Tw 2½ oz acetate of copper 1½ oz gum Senegal 1 lb (<i>Spons Encycl</i> 840)</p> | <p>DYE I76</p> |
| <p>THE TAN</p> <p>As a tan Catechu extract does not hold a very high position owing to the colour it imparts to the skin. It is said to contain from 45 to 55 per cent of tannin or about 10 per cent less than divi divi pods and 20 per cent less than gall nuts.</p> | <p>Brown Standard I77</p> |
| <p>FIBRE</p> <p>The Kew Museum catalogue describes a sample of fibre said to be prepared from the bark of this plant. I can find no record of fibre being prepared in India from the <i>Khair</i> tree.</p> | <p>Madder Brown I78</p> |
| <p>THE MEDICINE CATECHU</p> <p>Vern—Kath katthu HIND BENG Kath kach PB Kath BOMB MAR and SIND Kattakambu kashu kdshu katti 1AM Kanchu TEL Katti kashi katti MAL Kachu KAN Kaspu CINGH Kutho GUJ Katu SWAHILI Khadira khadirasdra SANS</p> <p>References—Pharm Ind 62 U S Dispens 15th Ed, 379 Fluck & Hanb Pharmacog 1879 244 Bentl and Trimen Med Plants 95 Royle's Mat Med Ed Harley 640 Dymock's Mat Med W Ind 230 U C Dutts Mat Med Hindus 158 O Shaugh D. p 302 Bidie's Cat Prod</p> | <p>TAN I79</p> |
| <p>A I81</p> | <p>FIBRE I80</p> <p>I81</p> |

**ACACIA
Catechu****Medicinal Properties of Catechu****MEDICINE**

Madras at Paris Exhib 1878 p 6 *Murray's Drugs of Sind* p 138
Burdwood's Bomb Prod 26 *Stewart's Pb Pl* 52 *Mooden Sheriff's*
Sup to Pharm Ind 20 *Ainslie's Mat Ind* 1 63 and 590

PROPERTIES AND THERAPEUTIC USES**MEDICINE
Extract
182**

THE RESINOUS EXTRACT is a powerful astringent and may be used where most other astringents are indicated

Internally it is useful in diarrhoea with pyrosis depending upon a relaxed state of the mucous membrane (*Pharm Ind*) Recommended to be given to adults in the form of a simple powder along with honey 15 20 grains or for dysentery in larger doses up to one drachm It holds the reputation of being useful in intermittent fevers and scurvy A small piece held in the mouth and allowed slowly to dissolve is an excellent remedy in relaxation of the uvula and the irritation of the fauces and troublesome cough which depend upon it (*U S Disp*) The Hindu physicians recommend a piece of Catechu rubbed with oil to be kept in the mouth in hoarseness (*U C Dutt*) Catechu boiled down in five times its weight of water to one eighth then flavoured with nutmeg camphor and betel nut and made into balls of a convenient size is directed to be kept in the mouth for affections of the gums palate tongue and teeth

**Injection
183**

Ainslie cautions the free use of Catechu in ordinary diarrhoea until the full extent of the complications with the liver have been ascertained

Locally it holds a high reputation in pyalism ulceration and sponginess of the gums relaxation of the uvula hypertrophy of the tonsils &c (*Pharm Ind*) An injection of the aqueous solution is often used in leucorrhoea and atonic menorrhagia In obstinate gonorrhoea gleet and leucorrhoea we have found it highly beneficial (*U S Disp*) A useful injection for severe hæmorrhage after confinement By Hindu physicians it is much used both internally and externally in skin diseases a decoction of Catechu is used as a wash for inflamed parts and ulcers (*U C Dutt*)

Stewart says it is used in the Panjab externally in ointment for itch syphilis and burns Chronic ulcerations attended by much fetid discharges are frequently speedily benefited by the use of an ointment composed of the fine powder and lard and in obstinate cases with the addition of sulphate of copper In prolapsus ani and protruding piles Catechu with lard and opium has been found of great service bathing or fomenting with an infusion of Catechu is also beneficial (*Murray p 138*) Recommended as a dentifrice in combination with powdered charcoal peruvian bark myrrh areca nut burned to charcoal powdered almond shell and many other combinations in which the Catechu exercises the chief influence

**Ointment
184
Dentifrice
185
Powder
186**

Opinions of Medical Officers—§ As a styptic in hæmorrhage the powdered extract has been found useful if sprinkled over the wound (*Civil Surgeon Aligarh*) Reported to be beneficial as a local application in primary syphilitic sores (*Dr Parker Poona*) A useful application to sore nipples and as a preventive against the ill effects of nursing may be used in infusion as a wash for some weeks before confinement (*Surgeon Major Hunter Karachi*) Mixed with aromatics it is used by natives in melancholia powdered and mixed with water it is used in conjunctivitis Hakims state that it will produce abortion but that at the same time it is useful for women who are barren but are desirous of having offspring (?) (*Dr Emerson Calcutta*) Powdered and rubbed up with sulphate of copper and yolk of eggs it is a common application to cancers in East Africa (*Surgeon Major Robb Bombay*) A mixture of Catechu and Myrrh called **Kathbol** is very generally given to women after confinement as a tonic and to promote the secretion of milk (*Surgeon Major W Dymock Bombay*)

**Kathbol
188**

| Medicinal Properties of Catechu | ACACIA Catechu |
|---|---|
| <p>It is used internally in congestion of the fauces sore throat hæmoptysis diarrhoea and dysentery Externally it is used as a wash in hæmorrhagic ulcers and with burnt areca nut in soft chancres It is believed to be anaphrodisiac and to cause impotence when used in excess' (<i>Brigade Surgeon F H Thornton BA MB Monghyr</i>) It is a valuable astringent Internally the extract with opium or other medicines is preferable in a pillular form dose gr 5 to 15 grains The tincture is less efficacious Externally as a gargle and as a wash it is very serviceable where an astringent is wanted The tincture is a good application to sore or spongy gums (<i>Surgeon R L Dutt MD Pubna</i>) A most efficient and useful astringent largely used in Charitable Dispensaries and Hospitals (<i>Brigade Surgeon S M Shircore Moorshedabad</i>) Much used in cleaning the tongue and the gums of infants and is a preventive to the formation of ulcers (<i>Surgeon Major F M Zorab Balasore</i>)</p> | <p>MEDICINE 189</p> <p>Tincture 190</p> |
| <p>Astringent and tonic in diarrhoea in combination with aromatics such as cinnamon and nutmeg (<i>Surgeon C M Russell Sarun</i>) Pale catechu is also used in soft chancre after it has been softened in water and made into a paste (<i>Surgeon Anund Chunder Mookerjee Noakhally</i>) The only fact worth recording about this well known drug, is its supposed anaphrodisiac properties It is taken in doses of from ten to twenty grains (the powder being simply mixed with water) by Hindu widows with a view of suppressing sexual desire (<i>Surgeon R G Mathew Mosufferpur</i>) Catechu with areca nut slightly toasted and pounded into an impalpable powder is in common use by the natives for sponginess of the gums but the prolonged use of it darkens the teeth (<i>Hon Surgeon Easton Alfred Morris Negapatam</i>) Combined with the seeds of <i>Bonducella</i> and with sulphate of iron it is used for strengthening the gums (<i>Surgeon Major John Lancaster MB Chittore</i>)</p> | <p>191</p> |
| <p>Dose five to twenty grains as an astringent one to four grains as an expectorant It is used in bronchial affections with sugar candy and turmeric Frequently prescribed in diarrhoea as an astringent also as an astringent lotion in conjunctivitis and to ulcers It is supposed to have an analogous action to that possessed by ergot on the womb when prescribed with myrrh It increases the secretion of milk after delivery (<i>Surgeon W Barren Bhuj Cutch Bombay</i>) The powder is useful in otorrhoea it is also made up into an ointment with <i>ghî</i> and applied to cancers (<i>Surgeon James McCloghey Poona</i>)</p> | <p>192</p> |
| OFF PREPARATIONS | |
| <p>Infusion —160 grains in 10 fl ounces Dose one to two fluid ounces</p> | <p>193</p> |
| <p>Tincture —2½ ounces in 1 pint Dose one and a half to two fluid drachms A valuable adjunct to Mistura Cretæ and other astringent mixtures</p> | <p>194 195 196</p> |
| <p>Compound Powder —Dose fifteen to thirty grains A valuable aromatic astringent (<i>Pharm Ind</i>)</p> | |
| <p>KPERSAL OR KHFRSAL —The crystalline form of Catechuic acid found naturally in crevices of the wood fetches a high price in India as a drug and is regarded as a valuable cure for coughs (<i>See page 35</i>)</p> | |
| FOOD | |
| <p>The chief product of this tree is <i>Kath</i> and <i>Cutch</i> obtained by boiling down a decoction from the chopped wood, say for 20 hours continuously In the preparation of <i>kath</i> twigs are placed in the boiling liquid and upon these crystals of the substance generally known as <i>kath</i> are deposited Both <i>Kath</i> and <i>Cutch</i> are commercially designated Catechu but the</p> | <p>FOOD Part 197</p> |

**ACACIA
concinna****The Soap-Acacia.****FOOD**

former is regarded as purer than the latter and is largely used as an ingredient in the *pan* or the betel leaf preparation which the natives of India are so fond of chewing. The *Kath* is reduced to a fine powder a little of which is smeared on the *pan* leaf together with some white lime and crushed betel nuts. It is the *Kath* in combination with the lime which gives the teeth and lips the red colour so characteristic of Hindus. Continued use blackens the teeth. The people of Assam very seldom eat *Kath* with *pan* as they consider it too rich for them. (*Mr Darrah Assam*)

THE TIMBER**TIMBER
198**

Structure of the Wood—Sapwood yellowish white heartwood either dark or light red extremely hard. The wood seasons well takes a fine polish and is extremely durable. *Cleghorn* says the wood of this plant is less hard and durable than that of other Acacias. It is not attacked by white-ants or by teredo.

199

It is used for rice pestles oil and sugarcane crushers agricultural implements bows spear and sword handles and wheelwrights work. In Burma it is employed for house posts and very largely as firewood for the steamers of the Irrawaddy Flotilla. The felling of Cutch trees for the purpose of fuel should however be altogether prohibited although the wood is greatly admired for its high heating powers. It is much valued in Broach for posts which have to be driven into the ground. The fuel of the dead *khair* is much valued by goldsmiths. In North India it is made into charcoal and is one of the best woods for that purpose. It has been found good for railway sleepers and it is probably only the smallness of the tree and the consequent waste in cutting up that has prevented its more general use. A cubic foot of the wood weighs about 70 lbs.

Several other plants yield Catechu such as **A. Suma**, **Areca Catechu**, and **Uncaria Gambier**,—see **Catechu**

Acacia Campbellii, Arn

Syn for **A. planifrons**, *W & A*

A. chrysocoma, Miq

Syn for **A. tomentosa**, *Willd*

200**A. concinna, DC Fl Br Ind II 296**

Syn.—*MIMOSA CONCINNA Willd Roxb Fl Ind Ed C B C 424.*

Vern.—*Rithá kochi* HIND *Ban rithá* BENG *Toldung* LEPCHA
Saptala SANS, *Aila rassaul* OUDH *Sika shika* BOMB *Sikekdi*
MAR DUK *Shiká kai* MAR *Chikakai* GUJ *Shika* TAM *Chikaya*
shikaya gogu TEL *Sigé sigé* (the unripe fruit being known as *kayi*)
KAN *Ken bwon kinbun subókínwé* (or *su kwot nwé* or *soop wotnway*)
BURM

Rita or *ritha* is the Hind for the Soap-nut **Sapindus Mukorosi, Gaertn**. As this name is also given to the detergent legumes of **Acacia concinna, DC** the two bazar products require to be carefully distinguished.

References—*Brandis For Fl 423 Gamble Man Timb 150*

Habitat—A common prickly scandent bush common in the tropical jungles throughout India in Bengal flowering during the rains. Very common in East and Central Mysore planted as a hedge.

Botanic Diagnosis—*Prickles* abundant minute hooked. *Leaves* with 12-16 pinnæ and 30-50 leaflets, *stipules* and *bracts* cordate ovate. *Flowers* in copiously paniced globose yellow heads *panicles* with densely downy branches the lower springing from the axils of the leaves the upper

| Dye Soap, Medicine, Hair-wash | ACACIA CONCINNA |
|--|---|
| <p>subtended by copious membranous, subpersistent bracts <i>Corolla</i> a little longer than the calyx <i>Pod</i> thick succulent strap shaped straight 3.4 by $\frac{1}{2}$ inches depressed between the seeds the broad sutures narrowed to a short stalk when dry shrivelled and rugose with slightly waved sutures when young hairy</p> <p>This species belongs to the series Vulgares Climbers with copious scattered prickles and flowers in globose heads forming panicles —</p> <p>A. concinna, A. Intsia, and A. pennata</p> <p><i>Properties and Uses—</i></p> | DYE 201 |
| <p>Dye—Balfour says the bark is used for dyeing and tanning fishing nets in South India</p> | |
| <p>§ The bark is imported into Bombay from Kanara for this purpose (<i>Surgeon Major W Dymock Bombay</i>)</p> | |
| <p>Turmeric and the leaves of this acacia afford a beautiful green dye (<i>Mason</i>) (<i>I N Pickard Esq Burma For Dept</i>)</p> | |
| <p>Soap—A considerable trade is carried on in some parts of India with the saponaceous legumes of this species (<i>Roxburgh</i>) The thick fleshy pods are used for washing the hair (<i>Gamble</i>) The nut of the <i>Shikakai</i> is used in the Kolaba district Bombay instead of soap (<i>Bombay Gas XI 26</i>) In Kanara they sell at ₹12 to 20 for 560 lbs every other year comes a bumper crop (<i>Bombay Gas XV Part I 60</i>)</p> | DETERGENT Pods 202 |
| <p>The legumes of several other species of Acacia are also used for this purpose being regarded as efficacious in destroying vermin To Ainslie must be attributed all our information regarding these pods very little having been obtained regarding them since he wrote</p> | |
| <p>Medicine—The pods are largely used by the natives of India externally as a detergent and internally they are deobstruent and according to Ainslie are also expectorant Ainslie recommends the drug to be prescribed in the form of an electuary in a dose about the size of a small walnut every morning for three successive days Dr Dymock gives the value in Bombay as ₹1½ to 1¾ a maund of 37½ lbs</p> | MEDICINE Pods 203 |
| <p>§ In South India the pods and leaves are used as an aperient in bilious affections (Ainslie) (<i>Surgeon Major W Dymock Bombay</i>) The pods of A. concinna are a mild cathartic nauseant and emetic As a cathartic it is superior to senna but it is rather nauseous and disagreeable in taste and smell Like senna it is not an efficient purgative when used alone but a very good adjunct to other purgatives as sulphate of magnesia The pods are also a pretty good emetic in jaundice not depending upon obstruction (<i>Honorary Surgeon Moodeen Sheriff Khan Bahadur Madras</i>) A popular household remedy for promoting the growth of hair and removing dandruff from the scalp a decoction of pods ($\frac{1}{2}$ an ounce to the pint of water) being used as a hair wash In small doses the pods act as a tonic but in large and repeated doses they have purgative and emetic properties assigned to them (<i>Surgeon Major F M Honston Travancore</i> and <i>John Gomes Medical Store keeper Travandrum</i>)</p> | 204 |
| <p>Very young leaves ground up with a little salt tamarind and a few chillies are used by the natives as a chutney with their food when they suffer from biliousness I have seen it act as a laxative producing one or two copious motions deeply tinged with bile it is also a detergent (<i>Honorary Surgeon Easton Alfred Morris Negapatam</i>) Powdered leaves in form of infusion act as a mild laxative, can be used as a substitute for Senna indica but less powerful in action Tender leaves are used by natives in the form of chutney in bilious affections with successful results (<i>Surgeon E W Savinge Rajamundry Godavery District</i>) The tender leaves made into a decoction are used as an aperient (<i>Surgeon Major John Lancaster M B Chittore</i>) The</p> | Hair wash 205 |
| | Leaves. 206 |

**ACACIA
decurrens****The Silver Wattle**

tender leaves are subacid and make a good chutney. The pods are in daily use for washing purposes" (*Native Surgeon Ru'hniam T Moodel liar Chingleput, Madras*). An infusion made from the pods is given to check malarious fevers. The tender leaves made into infusion, or ground down into a paste are used to prevent flatulence and to act as a mild laxative (*Dr Lee Mangalore*). The pods of this species are largely used for washing the hair in Madras' (*Deputy Surgeon General G Biate M B C I E Madras*). The pods are used in the form of an ointment in skin diseases (*Surgeon J Parker M D Poona*).

Food—The leaves are pleasantly acid and they are sometimes used by the Hindus as a substitute for tamarind and are made into chutney.

Domestic Uses—The Hindus according to Drury use the (legumes) pods to mark the forehead. This statement requires confirmation. They are largely used as a substitute for soap especially to wash the hair. The *sige kayi* or soap nut is planted for village hedges in the East but it grows wild in Manjarabad and Belur (*Mysore Gaz 291*).

FOOD
The Leaves
207
DOMESTIC
Pods
Soap
208

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Acacia dealbata, Link Fl Br Ind II 292**THE SILVER WATTLE**

References—*Brandis For Fl 180 Gamble Man Timb 155 Benth Fl Austr II 415 Mueller's Extra Tropical Plants 4*

Habitat—A tree spreading rapidly by numerous root suckers indigenous in New South Wales Victoria and Tasmania introduced on the Nilgiris and now naturalised since 1840. Experimentally cultivated in the Panjab.

Structure of the Wood—The wood is moderately hard light brown but warps considerably. It is extensively used in Australia for timber.

According to **Mueller** this is placed as a variety under **A. decurrens**, *Willd* the Black Wattle. It prefers for its habitation humid river banks and attains there a height of sometimes 150 feet supplying a clear and tough timber used by coopers and other artisans but principally serving as select fuel of great heating power.

Tan—The bark of this variety is much thinner and greatly inferior to the Black Wattle in quality yielding only about half the quantity of tanning principle. It is chiefly employed for lighter leather. This tree is distinguished from Black Wattle by the silvery or rather ashy hue of its young foliage; it flowers early in spring ripening its seed in about five months while the Black Wattle blossoms late in spring or at the beginning of summer and its seeds do not mature before about 14 months (*Baron von Mueller Select Extra Tropical Plants 4*).

Introduced in the Nilgiris where a very curious fact has been observed about the wattle tree. In 1845 and up to about 1850, the trees flowered in October which corresponded with the Australian flowering time but about 1860 they were observed to flower in September in 1870 they flowered in August in 1878 in July and here this year 1882 they have begun to flower in June this being the spring month here corresponding with October in Australia. It is very curious that the tree takes nearly 40 years to regain its habit of flowering in the spring *see* to become perfectly acclimatised (*Ind For, VIII, 26*).

TIMBER
210

TAN
Bark
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A. decurrens, Willd**THE BLACK WATTLE**

Habitat—The eastern part of South Australia through Victoria and New South Wales to the southern part of Queensland.

A 212

The Black Wattle

ACACIA
dumosa

A small or middle-sized tree. The bark constitutes the tanner's wattle bark. It is rich in tannin and this fact together with the many uses of the gum derived from the tree make this one of Australia's most valuable plants.

TAN — In England the price of wattle bark runs from about £8 to £11 in Melbourne about £5 a ton. It varies so far as experiments made in my laboratory have shown in its contents of tannin from 30 to 54 per cent in bark artificially dried. In the mercantile bark the percentage is somewhat less according to the state of its dryness it retaining about 10 per cent moisture. 1½ lb of black wattle bark gives 1 lb of leather whereas 5 lbs of English oak bark are requisite for the same results but the tannic principle of both is not absolutely identical. Melbourne tanners consider a ton of black wattle bark sufficient to tan 25 to 30 hides. It is best adapted for sole leather and other so-called heavy goods. The leather is fully as durable as that tanned with oak bark and nearly as good in colour. Bark carefully stored for a season improves in tanning power 10 to 15 per cent. From experiments made under the author's direction it appears that no appreciable difference exists in the percentage of tannin in wattle bark whether obtained in the dry or in the wet season. The tannin of this *Acacia* yields a grey precipitate with the oxide salts of iron and a violet colour with sub oxides. It is completely thrown down from a strong aqueous solution by means of concentrated sulphuric acid. The bark improves by age and desiccation and yields about 40 per cent of Catechu rather more than half of which is tannic acid. Bichromate of potash added in a minute quantity to the boiling solution of Mimosa tannin produces a ruby red liquid fit for dye purposes and this solution gives, with the salts of sub oxide of iron, black pigments and with the salts of the full oxide of iron, red browndyes. As far back as 1823 a fluid extract of wattle bark was shipped to London fetching then the extraordinary price of £50 per ton, one ton of bark yielding 4 cwts of extract of tar consistence (Simmons) this saving much freight and cartage. For Cutch or Terra Japonica the infusion is carefully evaporated by gentle heat. The estimation of tannic acid in *Acacia* barks is effected most expeditiously by filtering the aqueous decoction of the bark after cooling by evaporating and then re-dissolving the residue in alcohol and determining the weight of the tannic principle obtained by evaporating the filtered alcoholic solution to perfect dryness.

The cultivation of the black wattle is extremely easy being effected by sowing either broadcast or in rows. Seeds can be obtained in Melbourne at about 5s per lb which contains from 30 000 to 50 000 grains. They are known to retain their vitality for several years. Seeds should be soaked in warm water before sowing. Any bare barren unutilised place might most remuneratively be sown with this Wattle *Acacia*. The return would be in from five to ten years. Full grown trees which supply also the best quality yield as much as 1 cwt of bark. I have taken the liberty to extract almost the entire article published by **Baron von Mueller** **KOMG** in his exceedingly valuable work 'Select Extra Tropical Plants' thinking it was certain to prove most useful to persons experimenting in India with the cultivation of the wattle or with its most valuable tanning bark. The variety *mollis* (*A. mollissima*, Willd.) is the most plentiful form in Victoria and this is also admitted to be the most powerful tanning agent. It grows rapidly and in addition to the bark and gum which it affords the timber is much valued chiefly as fuel.

A fuller account of this plant and of the other trees yielding the commercial product will be found under the name **WATTLE BARK**.

Acacia dumosa, W & A

Syn for **A. Latronum, Willd**

TAN
Bark
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TIMBER
214

A 214

ACACIA
Farnesiana**The Cassie.**

215

Acacia eburnea, Willd *Fl Br Ind, II* 293Syn — *MIMOSA EBURNEA* Roxb *Fl Ind Ed C B C* 421Vern — *Marmati* MARReferences — *Brandis For Fl* 183 *Gamble Man Timb* 151**Habitat.**—A short or small deciduous tree, met with in Sind Suliman Range Berar Deccan and South India**Botanic Diagnosis.**—General habit of *A arabica* Leaves with 4 to pinnæ and 12 to 16 leaflets Flowers in rounded yellow heads in the axils of undeveloped leaves peduncles densely grey downy with involucre about the middle Pod narrow linear straight rigidly coriaceous, dehiscent glabrous with slightly repand suturesCompare with *A arabica* and the other members of this series**Properties and Uses.**—TIMBER
216**Structure of the Wood.**—Hard yellowish white splits in drying Weight 52 lbs per cubic foot**A elata, Wall** Syn for *Albizzia procera Benth var elata***A Farnesiana, Wall** Syn for *A planifrons, W & A*

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A. Farnesiana, Willd *Fl Br Ind, II*, 292 *Wight Ic* t 300THE CASSIE FLOWER *Eng*Syn — *MIMOSA FARNESIANA* LinnVern — *Wilayati kihar wilayati babul pissi babul gu kihar gand babul guh-babul* HIND DUK *Guya babula* BENG *Gabur SANTAL Gu babul* MAR *Talbawal* GUJ *Knebamal* SIND *Veddavala pu velam* TAM *Kusturi piktumi oda sale murki tumma naga tumma kampu tumma* TEL *Jali KAN Hnanlong yang* (or *Huanlongyang*) *nanlon yang* or *nan loon gyaing* BURM**Moodeen Sheriff** seems to think that because the name *Kasturi* or *kasturi tumma* TEL is inappropriate for this plant it is incorrectly applied to itReferences — *Roxb Fl Ind Fd C B C* 421 *Brandis For Fl* 165 *Gamble Man Timb* 150 *Baillon II* 41 *Mueller Select Extra Tropical Plants* 4 *Smith's Dict* 3 *Presse on Perfumery* 106 *Hanbury's Science Papers* 151 152 *Atkinson's Gums and Gum Resins* 9**Habitat.**—*The Flora of British India* regards this small tree as indigenous to India cosmopolitan in the tropics but often cultivated It is common enough everywhere in India and Burma growing freely by self sowing Its strong scented yellow flower heads perfume the atmosphere very pleasantly Cultivated in Europe and most successfully at Cannes It is abundant in the valley of the Dead Sea where it is covered with the scarlet flowers of the parasite *Loranthus acaciae*, giving the effect as if on fire**Botanic Diagnosis.**—An erect shrub or low tree with straight spines flowering in the cold season Flowers in rounded heads axillary fragrant bright yellow supported upon peduncles which are crowded in the nodes of the leaves and having a whorl of bracts like an involucre at the apex Pod thick swollen or fleshy cylindrical more or less curved or hooked glabrous and having straight sutures Seeds biserialAllied to *A planifrons, W & A* a tree of the Western Peninsula with umbrella like spreading branches and flower heads in clusters in the axils of mature bracts Compare with *A arabica*.**Properties and Uses.**—GUM
218**Gum.**—The gum is collected in Sind *Bomb Gas XV Part I*, p 60 says the gum exudes from the trunk in considerable quantities **Waring** states that it is considered superior to gum arabic in the arts and as a medicine **Murray** remarks that it is used to adulterate gum arabic It is

A 218

Dye, Tan, Perfumery, Medicine, Timber

ACACIA
Farnesiana

very desirable that its peculiar properties should be investigated adulteration has in all probability prevented it from becoming better known **Mr Baden Powell** (*Pb Pr I 345*) describes it as dark conchoidal masses translucent and transparent at the edges Some pieces are much whiter

§ The distilled flowers yield a delicious perfume and the gum is generally considered useful (*J C Hardinge Esq Rangoon*)

A fair substitute for gum arabic A decoction may be used internally in diarrhoea and externally where an astringent is required (*Surgeon R L Dutt M D Pubna*)

Dye and Tan—**Ohristy** in his *New Commercial Plants* includes the bark of this tree among the Indian tans It is not in much demand for this purpose in India but is reported to be sometimes used in Dacca mixed with salts of iron It gives an inky dye The pods are also used in some parts of Bengal as a dye stuff (*Dr H McCann*)

Perfumery—The round yellow heads constitute the Cassie flowers so much used in European perfumery With the development of the art of perfumery in India this plant should prove a source of wealth It grows freely without any care whatever and should it ever be cultivated there cannot be a doubt but that it would prove a great success **Piesse** says that the European practice is to sow the seeds in beds the best plants being left and the doubtful ones removed In the third year they are two to three feet in height and are then planted out into the fields each tree receiving about 12 square feet Before planting out to their final places the ground is recommended to be well ploughed and manured and dug to the depth of 4 to 6 feet The locality chosen for cultivation should be exposed to the sun After the third year the trees produce flowers A full grown tree is calculated to yield 2 lbs weight of flowers valued at from three to four pence a lb the acre under Cassie cultivation in Europe thus giving £30 to £40 **Hanbury** in his *Science Papers* gives the value of Cassie flowers in Cannes as five to six francs the kilogramme

The plant is wild in most parts of Bengal and its cultivation might if used as a hedge plant or if scattered through the fields devoted to garden produce be most profitable The flowers are a certain source of wealth The gum seems likely to hold in the future a much higher position than in the past The pods yield dye and the leaves in times of scarcity would prove an important addition to the fodder sources of the country **Piesse** says

I cannot leave Cassie without recommending it more specially to the notice of perfumers and druggists as an article well adapted for the manufacture of essences for the handkerchief and pomades for the hair When diluted with other odours it imparts to the whole such a true flowery fragrance that it is the admiration of all who smell it and has not a little contributed to the great sale which certain proprietary articles have attained The Cassie perfume retains its fragrance for a long time and is hence most useful for sachets For this purpose a good combination is Cassie heads 1 lb orris root 1 lb The perfume Cassie should not be confounded with Cassia or Cinnamon

Medicine—The bark is astringent and is often used as a substitute for *Acacia arabica* bark **Mr Baden Powell** says the pods contain a balsamic liquid

§ It is used as an adjunct to aphrodisiacs in the treatment of spermatorrhoea (*Surgeon Major C W Calthrop M D Morar*) The bark is used as an astringent in the form of a decoction strength 1 to 10 of water The tender leaves bruised in a little water and swallowed are said to be useful in gonorrhoea dose $\frac{1}{2}$ ounce (*Surgeon James McCloghey Poona*)

Structure of the Wood—White close grained hard and tough Weight 49 lbs per cubic foot

GUM

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DYE

Bark

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PODS

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TAN

222

PERFUMERY

Flower heads

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MEDICINE

The Bark

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Leaves

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TIMBER

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ACACIA
Intsia**Dye, Soap substitute****DOMESTIC**
228

In the Panjáb usually grown as a fence for which purpose it answers well

Domestic Uses—§ The plant is supposed to be obnoxious to rats and snakes and is accordingly planted as a protection against the injury caused by these animals burrowing in the embankments (*Rev A Campbell Santal Mission Pachumba*)

229

Acacia ferruginea, DC *Fl Br Ind II, 295* *Bedd, Fl Sylv, t 51*

Syn—MIMOSA FERRUGINEA Roxb *Fl Ind II 561*

Vern—*Khaur* NEPAL *Kayser* PANCH MAHALS *Son khaur* BERAR *Kar khaur* GOND *Pándhra khaur* MAR *Teórikhair* BHIL *Banni* KAN *Shimai-velvelam* *shemi-velvel* TAM *Ana sandra wuni* TEL

References—*Brandis For Fl 185 Kurr Burm For Fl I 423 Gamble Man Timb 153*

Habitat—Found in Northern Bengal Central and South India and Gujarát

Botanic Diagnosis—A large deciduous tree with brown bark *spines* short hooked in pairs *leaves* composed of 6-12 pinnæ and 20 to 40 leaflets *Flowers* in peduncled spikes in the axils of the leaves *rachis* glabrous *corolla* 2 3 times the campanulate and glabrous *calyx* *Pod* straight strap shaped 3 4 inches long veined the upper suture winged distinctly stalked and 4 6 seeded

Compare with **A. Catechu**

Properties and Uses—

Gum—It yields a good gum similar to gum arabic

Medicine—The bark possesses astringent properties

Structure of the Wood—Sapwood large heartwood olive brown extremely hard harder than **A. Catechu** Weight 70 lbs per cubic foot A fine timber but little used *Beddome* says it is used for building carts and for agricultural implements

GUM
230
MEDICINE
231
TIMBER
232

A. Hookeriana, Zippel

Syn for **A. concinna, DC**

A. indica, Desv

Syn for **A. Farnesiana Willd**

233

A. Intsia, Willd *Fl Br Ind II, 297*

Syn—MIMOSACÆSIA Roxb M INTSIA Linn

Vern—*Arhai ka bel* SUTLEJ, *Katrar* KUMAON *Kondrojanum* SANTAL *Kundaru* KOL *Harrari* NEPAL *Payir rik ngræm rik* LEPCHA *Korinta kórendam* TEL *Chilari* MAR

References—*Kurr Burm For Fl I 423 A. cæsia, W & A Brandis For Fl 189 M. cæsia, Roxb Fl Ind II 565*

Habitat—A large climber found in the Sub Himalayan tract from the Chenab eastward (ascending to 4 000 feet) throughout India and Burma

Botanic Diagnosis—*Prickles* minute hooked *Leaves* with 12 16 pinnæ and 16 24 ligulate-oblong leaflets *Flowers* in globose yellow heads panicled *bracts* minute lanceolate *Pod* dry thin straight strap shaped glabrous smooth 4 6 inches long by $\frac{1}{2}$ to $1\frac{1}{2}$ broad cuneately narrow to a short stalk

Var cæsia, W & A Leaflets 40-60 not more than $\frac{1}{4}$ to $\frac{1}{2}$ inch broad obtuse with a minute point Western Himálaya, 3,000 feet Sikkim 5 000 feet

Var oxyphylla, Grah sp Leaflets 40-50, more membranous than in the preceding, and acutely pointed

A 233

Dye, Medicine, Timber

ACACIA
Latronum.Compare with **A. concinna**.*Properties and Uses—*

Dye—The bark or the fresh leaves of this plant are said to be used as an auxiliary or astringent in dyeing with morinda or lac giving brightness (*McCann*) The bark is also used as a substitute for soap to wash the hair (*Gamble*)

Medicine.—§ The flowers are used by Santal women in deranged courses (*Rev A Campbell Santal Mission Pachumba*)

Structure of the Wood.—White soft porous

Acacia Jacquemontii, Benth Brandis For Fl, 193

Vern—*Hausa*, AFG *Kinkar babul bamul babul Pa Rátobdval* Guy

References—*Fl Br Ind II* 293 *Gamble Man Tymb* 150

Habitat—A small bushy thorny shrub met with on the east flank of the Suliman Range ascending to 2 500 and at times to 3 200 feet on the outer Himálaya near the Jhelum to about the same elevation on the Panjab plains in Sind and on the banks of the Nerbudda. Common in ravines and dry water courses in Rájputana and North Gujarát (*Brandis*)

Botanic Diagnosis—An elegant shrub with polished stems and straight polished and slender spines *Leaves* composed of 6-8 pinnæ and 12-16 leaflets *Flowers* in rounded axillary heads yellow sweetly scented *Pod* thin flat broad ligulate dehiscent glabrous grey with straight sutures 2-3 inches long *Seeds* 5-6

Allied to **A. eburnea**, Willd which has narrow pods and to **A. tomentosa**, Willd which has purple heads Compare with **A. arabica**

Properties and Uses—

Gum.—§ The var *baonli* (*Rájputana*) a bush with straight slender branches common in dry sandy water courses yields a small quantity of gum resembling that from **Acacia arabica**. (*E A Fraser Raj putana*)

Tan—§ The bark is used in tanning and gives a brown or black colour (*E A Fraser Rajputana*)

Spirits—The bark of the root is used in the distillation of spirits the branches are lopped and the leaves thrashed out with sticks are used as fodder (*Brandis*)

Domestic Uses—The polished stems and thorns and the sweetly scented yellow flowers make this bush an object of much beauty and interest (*Raj Gas* 29) Might with advantage be extensively cultivated as a hedge plant and its flowers collected for perfumery purposes

A. Latronum, Willd Fl Br Ind II 296 Wight Ic t 1157

Vern—*Bhes* HIND *Devbabbul* MAR *Pakituma* TEL *Donn mulli na jali* KAN *Hote jali* MYSORE

References—*Brandis For Fl* 180 *Gamble Man Tymb* 149

Habitat.—A thorny shrub found in South India forming gregarious thickets

Botanic Diagnosis—A small tree with umbrella like head and brown glabrous branches *spines* in pairs long straight *Leaves* composed of 6-10 pinnæ and 20-30 leaflets *Flowers* in pedunculate spikes abundantly produced from the nodes of leafless branches *corolla* $\frac{1}{4}$ inch long and 3 or 4 times the minute campanulate and glabrous *calyx* *Pod* oblong thin flat somewhat recurved

In the nature of its spines this species departs from the character of the series having more the form of the spines of **A. arabica** (series *Globiferæ*) See **A. Catechu**

DYE
Bark and
Leaves.
234
SOAP
SUBSTITUTE
Bark
235
MEDICINE
Flowers
236
TIMBER
237
238

GUM
239
TAN
The Bark
240
Spirits.
241
FODDER
The Leaves.
242
DOMESTIC
Hedge
243
244

**ACACIA
leucophlœa****Gum, Dye, Fibre, Medicine Food.****FIBRE**
Bark
245
TIMBER
246*Properties and Uses—***Fibre**—It is said to yield a good fibre Bark dark brown dotted with white (*Brandis*)**Structure of the Wood**—Useful for tent pegs (*Bomb Gas XV Part I p 60*)**247****Acacia lenticularis, Ham Fl Br Ind, II 296****Vern**—*Khin KUMAON***References**—*Brandis For Fl 186 Gamble Man Timb 150***Habitat**—A small tree of the Siwaliks and of Kumaon extending to the Rájmahal Hills in Bengal to Central and South India and Burma**Botanic Diagnosis**—*Spines* in pairs short hooked or recurved *Leaves* with 4 8 pinnæ and 12 16 leaflets *Spikes* very dense shortly pedunculate 3 4 inches long *Corolla* twice the length of the campanulate calyx *Pod* straight 6-8 inches long by $\frac{1}{4}$ broad thin flat opaque venulose with both sutures thickened and wingedCompare with **A Catechu****Gum**—Yields an Acacia gum**GUM**
248**249****A. leucophlœa, Willd Fl Br Ind, II 294 Bedd, Fl Sylv, t 48****Syn**—*MIMOSA LEUCOPHLOEA Roxb***Vern**—*Safed kîkar reru raunj karîr nimbar ringa rinj rohani jhind*
HIND *Safed babul BENG Sharáb kî kîkar hwar DUK Gosra*
URIYA *Shvêta barburâ vrikshaka (modern) SANS Safed kîkar PB*
ARINJ RAJ *Raundra runjra BANSWARA Renuja BIJERAGOGAKH*
TUMMA *reunja rinja GOND Hewar C P MAR Haribâval GUJ*
HIVAR *pânharya bâbhuliche jhada MAR Vel-velam vel vel vevay*
lam TAM *Tella tuma TEL Bih jali togral natbela or nayi bêla*
(Gas Mysore) *vel-vaila bilijali topâl KAN Katu vela maram*
andara SINGH *Tanaung BURM***References**—*Brandis For Fl 184, Kurs Burm For Fl I 421 Gamble Man Timb 152 Roxb Fl Ind Ed C B C 421 Atkinson Gums and Gum resins p 9***Habitat**—Found in the plains of the Panjâb from Lahore to Delhi and in all forest tracts of Central and South India Rajputana and Burma (in the dry forests of Prome) Seems indifferent to climatic conditions**Botanic Diagnosis**—A large deciduous tree with short straight and white spines *Leaves* composed of 12 24 pinnæ and 30 to 60 leaflets *Flowers* in small rounded yellow heads aggregated into terminal panicles which when fully expanded are a foot long and broad and densely tomentose *Pod* sessile narrow ligulate falcate thin flat tomentose with straight sutures The inflorescence of this species is its most characteristic featureCompare with **A arabica***Properties and Uses—***Gum**—The gum yielded by this plant is used in native medicine it somewhat resembles gum bassora and received that name from **Ure****Dye**—The leaves and bark are used in dyeing and give a black colour The bark is also used for dyeing in Burma and gives a red colour but mixed with other barks gives black (*Prof Romanis Rangoon*)**Dr Schlich** (*C P Forest Adm Report 1883 p 45*) says he found the bark of *Hewar* being prepared for export but he seems to have omitted to note the economic use for which it was to be exported**Fibre**—A coarse tough fibre is prepared from the bark much valued for fishing nets and ropes (*Bom Gas XII 25 also XV Part I p 60*)**Dr Brandis** says by steeping the bark in water for four or five days and**GUM**
250
DYE
Leaves and
Bark
251**FIBRE**
Bark
252

| The Australian Black wood | ACACIA modesta |
|--|--|
| beating it a tough fibre may be obtained which is used for making nets and coarse cordage | |
| Medicine —The bark partakes more or less of the astringent properties of <i>A. arabica</i> . In an official correspondence with the Government of India it is recommended that this drug should be excluded from further trial | MEDICINE Bark 253 |
| Food — Dr Brandis says that the young pods and seeds are eaten and even the bark in times of scarcity is ground and mixed with flour. The latter is used to assist in preparing spirits from sugar and palm juice to precipitate by the tannin which it contains the albuminous substances in the juice and to facilitate the fermentation. It flavours at the same time the spirits and is supposed to increase the amount of alcohol. This fact was first ascertained and pointed out by Mr Broughton , the Quinologist on the Nilgiris (<i>Deputy Surgeon General G. Bidie M.B. C.I.E. Madras</i>). The fruit is largely collected for fodder in the Panjáb. | FOOD Bark 254 Spirits 255 |
| § In the South Mahratta Country the bark is used in the distillation of a spirit in consequence of which the trees are farmed on account of Government (<i>Surgeon Major W. Dymock</i>). | FODDER Fruit 256 |
| The legumes are called <i>Padia</i> which are pickled in Kathiawar (<i>Asst. Surgeon Sakharam Arjun Ravat L.M. Girgaum Bombay</i>). | |
| Structure of the Wood —Sapwood large heartwood reddish brown with lighter and darker streaks extremely hard. It seasons well and takes a good polish is strong and tough but often eaten by insects. It is brittle makes good posts but bad plank (<i>Bomb. Gaz. XII 25</i>). It makes an excellent fuel. When seasoned a cubic foot weighs about 55 lbs (<i>Bomb. Gaz. XV Part I p. 60</i>). | TIMBER 257 |
| Acacia megaladena , Desv. Syn. for <i>A. pennata</i> , Willd. | |
| A. melanoxylon , R. Br. | 258 |
| THE AUSTRALIAN BLACK WOOD | |
| References — <i>Benth. Fl. Aust. II 415</i> <i>Mueller's Select Extra Tropical Plants 6</i> <i>Brandis For. Fl. 180</i> <i>Gamble's Man. Timb. 155</i> <i>Kew Museum Cat. p. 56</i> | |
| Habitat .—A large tree met with in New South Wales Victoria Tasmania and South Australia introduced on the Nilgiris since 1840 and now completely naturalised. Also being grown in the hills of the Panjáb Kumaon and Sikkim. | |
| Botanic Diagnosis — <i>Leaves</i> seen only in young trees and then bipinnate generally abortive and represented by phyllodia. <i>Flowers</i> in globose compact heads on short axillary racemes. | |
| <i>Properties and Uses</i> — | |
| Structure of the Wood —Hard and durable heartwood dark brown beautifully mottled soft shining and even grained. Weight 41 to 48 lbs per cubic foot in Australia 36 lbs on the Nilgiris. | TIMBER 259 |
| It is used in Australia for cabinet work coach building railway carriages and agricultural implements on the Nilgiris chiefly for fire wood. Regarded as one of the best Australian woods being easily cut into veneers. It takes a fine polish and is considered as almost equal to walnut (<i>Mueller</i>). | 260 |
| A. modesta , Wall. <i>Fl. Br. Ind. II, 296</i> | 261 |
| Syn. — <i>MIMOSA DUMOSA</i> Roxb. <i>Fl. Ind. II 559</i> and probably <i>M. OBOVATA</i> L. c. 561 | |
| Vern. — <i>Kantosariyo</i> GUJ. <i>Palosa</i> AFG. <i>Phulahi</i> PB. | |
| References — <i>Brandis For. Fl. 185</i> <i>Gamble's Man. Timb. 152</i> <i>Roxb., Fl. Ind. Ed. C.B.C. 646</i> <i>Atkinson Gums and Gum-resins p. 8</i> | |
| Habitat —Found in the Suliman and Salt ranges Sub-Himalayan | |

**ACACIA
planifrons****The Umbrella Thorn.**

tract between the Indus and the Sutlej, and in the northern part of the Panjab plains It is in fact one of the characteristic trees of the Panjab

Botanic Diagnosis—A moderate-sized tree *spines* in pairs short hooked *Leaves* with 4-6 pinnæ and 6-8 leaflets *Flowers* in peduncled spikes 2-3 inches long not very dense *Corolla* greenish coloured $\frac{1}{2}$ inch long twice the length of the glabrous campanulate *calyx* *Pod* 2-3 inches long by $\frac{3}{8}$ glabrous glossy venulose straight strap shaped narrowed into a short peduncle

Compare with **A. Catechu**.

Properties and Uses—

GUM
262

Gum—It yields a gum which occurs in the form of small round smooth, subtranslucent and very characteristic tears I found what appeared to be this gum being used by the Lucknow calico-printers under the name of *babul* It is quite tasteless

MEDICINE
The Gum
263
FODDER
The Leaves

Medicine—The gum which is used in native medicine is stated by Bellew to be regarded by the people of the Peshawar valley as restorative

Fodder—The leaves and fallen blossoms are collected for cattle fodder

264
TIMBER.
265

Structure of the Wood—Sapwood large white perishable heart wood dark brown with black streaks extremely hard—harder than that of **A. Catechu** A most beautiful wood strong and durable Weight about 70 lbs (In *Bomb Gaz VII* p 31 it is stated to weigh only 53-56 lbs) Valuable for cart wheels sugarcane crushers Persian water wheels and agricultural implements

DOMESTIC
Tooth
brushes
266

Domestic Uses—§ The delicate green twigs are used by the natives of the Panjab in the form of tooth brushes The bark though slightly unpleasant at first imparts subsequently a pleasant and sweet taste to the mouth' (*Asst Surgeon Bhagwan Das Rawal Pindi*)

Acacia paludosa, Miq Syn for **A. pennata, Willd**

267

A. pennata, Willd *Fl Br Ind II* 297 *Bot Mag t* 3408

Syn—*MIMOSA PENNATA Roxb M TORA Roxb ACACIA MEGALADENA Desv A PENNATA Dals & Gib*

Vern—*Agla awal KUMAON Thembi MAR Biswul HIND Kundaru KOL (Arar) KHARWAR Undaru SANTAL Gurwa MAL (S P) Arju NEPAL Tolrik LEPCHA Suyit BURM*

References—*Brandis For Fl 189 Kurz Burm For Fl I 424 Gamble Man Tumb 155*

Habitat—A large climbing shrub found in Oudh Kumaon Nepal Eastern Bengal Burma and South India

Botanic Diagnosis—*Prickles* fewer and less hooked than in **A. concinna** and **A. Intsia** *Leaves* with 16-30 pinnæ and 80-100 leaflets rigidly coriaceous very narrow densely crowded *Flowers* in heads forming panicles *bracts* minute lanceolate *Corolla* $\frac{1}{2}$ inch slightly exceeding the glabrous *calyx* *Pod* dry thin glabrous dehiscent 6-8 inches by $\frac{1}{2}$ to 1 $\frac{1}{2}$ strap shaped distinctly stalked There are three or four varieties of this species

Compare with **A. concinna**

Properties and Uses—

TIMBER
268

Structure of the Wood—Reddish porous moderately hard with large vessels and numerous medullary rays (*Gamble List Darj*) Weight 50 lbs per cubic foot

269

A. planifrons, W & A *Fl Br Ind, II, 293, Roxb, Cor Pl., t* 199

THE UMBRELLA THORN

Vern—*Salt sal, TEL*

A 269

| The Golden Wattle. | ACACIA Senegal. |
|--|--|
| <p>References—<i>Brandis For Fl</i> 575 <i>Gamble Man Timb</i> 150</p> <p>Habitat.—Western Peninsula</p> <p>Botanic Diagnosis.—A small gregarious tree with flat umbrella like spreading branches <i>branches</i> glabrous but with grey lenticular dots <i>Leaves</i> with 10-16 pinnæ and 16-24 leaflets <i>Flowers</i> in globular heads in clusters from the axils of branchlets <i>Pod</i> glabrous narrow ligulate turgid with straight sutures indehiscent distinguished from <i>A. eburnea</i> by being shorter and crooked Compare with <i>A. arabica</i>.</p> <p><i>Properties and Uses</i>—</p> <p>Structure of the Wood.—Hard and strong heartwood red, sapwood white</p> <p>Used for agricultural implements and as fuel</p> | |
| <p>Acacia pycnantha, Bth</p> | <p>TIMBER 270</p> |
| <p>THE GOLDEN OR GREEN WATTLE</p> | <p>271</p> |
| <p>Habitat—Victoria and South Australia</p> <p>This tree which attains a maximum height of about 30 feet is second perhaps only to <i>A. decurrens</i> in importance for its yield of tanner's bark the quality of the latter is even sometimes superior to that of the <i>Black wattle</i> but its yield is less as the tree is smaller and the bark thinner It is of rapid growth content almost with any soil but is generally found in poor sandy ground near the sea coast and thus is also important for binding rolling sand Experiments instituted by me have proved the artificially dried bark to contain from 30 to 45 per cent tanning principle full grown sound trees supplying the best quality The aqueous infusion of the bark can be reduced by boiling to a dry extract which in medicinal and other respects is equal to the best Indian Catechu as derived from <i>Acacia Catechu</i> and <i>A. Suma</i> It yields about 30 per cent about half of which or more is Mimosa tannic acid This Catechu is also of great use for preserving against decay articles subject to exposure in water such as ropes nets fishing lines &c "<i>A. pycnantha</i> is also important for its copious yield of gum The wood though not of large dimensions is well adapted for staves, handles of various instruments and articles of turnery especially bobbins (<i>Baron von Mueller Extra Tropical Plants</i>) It is remarkable that the Catechu like products of Australia are all apparently made from a decoction of the bark instead of the heartwood while in India the bark is rejected It is probable that a combination of both practices would be more remunerative</p> | <p>TAN Bark. 272</p> |
| <p>A. rupestris, Stocks is by <i>Fl Br Ind</i> reduced to <i>A. Senegal, Willd</i> which see</p> | |
| <p>A. Senegal, Willd <i>Fl Br Ind, II, 295</i></p> | <p>273</p> |
| <p>Syn—<i>A. RUPESTRIS</i> <i>Stocks</i> as in <i>Brandis For Fl</i> 185 <i>A. VEREK</i> <i>Guill et Perrot</i> <i>MIMOSA SENEGAL</i> <i>Linn</i> <i>M. SENEGALENSIS</i> <i>Lam</i></p> <p>Vern.—<i>Khor SIND</i> <i>Kumta RAJ</i> <i>Verek</i> in <i>WEST</i> and <i>Hashab</i> in <i>EAST AFRICA</i></p> <p>References—<i>Brandis For Fl</i> 185 <i>Rajputana Gazetteer, 29</i> <i>Flück and Hanb Pharmacog</i> 1879 233</p> | |
| <p>Habitat.—Chiefly found in <i>Sind</i> and <i>Ajmere</i> abundant in <i>West Africa</i> north of the <i>River Senegal</i> It is also found in <i>South Nubia</i> <i>Kord ofan</i> and in the region of <i>Atbura</i> in <i>East Africa</i></p> | |
| <p>Botanic Diagnosis.—A low tree with grey bark flexuose and glucose branches <i>spines</i> strong short, sharp hooked often 3 nate twolateral and one below the petiole <i>Leaves</i> with 6 to 10 pinnæ and 16-28 small ligulate leaflets and finely downy rachis about one inch long, with a gland at the</p> | |
| <p>A 273</p> | |

**ACACIA
Senegal****The True Gum Arabic**

base and between the upper pair of pinnæ *Flowers* in peduncled spikes *spikes* 2 3 inches long and not crowded *Corolla* yellow twice the length of the campanulate glabrous deeply toothed *calyx* *Pod* 3 by $\frac{1}{2}$ inch thin grey indehiscent straight strap shaped with a strong fibrous marginal midrib and constricted between the seeds

Compare with **A Catechu**

THE COMMERCIAL GUM ARABIC

**GUM
274**

In Sind and Rájputana the gum from this tree is collected but unfortunately it is sold in a mixed condition with the gums from other species of **Acacia**. This fact in all probability accounts for its superiority not having been recognised by the natives of India. It would be exceedingly interesting to have the gum carefully collected from Indian trees and chemically examined along with authentic samples from the African plant. The gum from the same species apparently varies considerably under diversified climatic conditions for from Africa widely different gums are exported to Europe and these meet the demands of distinct markets but are apparently obtained from one and the same plant. **Fluckiger** and **Hanbury** describe five or six African gums as regularly imported into Europe of which the gum from **A Senegal** is the most frequent abundant and valuable constituent.

**Senegal Gum
275**

1st —**Gum Senegal**, or the Gum of **A Senegal**, the *Verek* of the Negroes —To the French colony of Senegal (on the west coast of Africa) this is a most important product. The trade was first established by the Dutch and Portuguese but the French afterwards monopolised it and planted the colony of Senegal having St. Louis and Portendic as the chief ports for the exportation of the gum. The tree from which this gum is obtained was first accurately described by **Adanson** in 1788. It is collected by the Moors after the close of the rains in November (when the wind sets in from the desert) up till July. The gum is found to exude in greatest abundance during the dry desert winds and most frequently at the bifurcations of the branches. **Mr M O Martius** has also observed that the production of the gum is stimulated by the growth of the parasite **Loranthus senegalensis**. The principal supply is to the north of the River Senegal or about 16° N latitude. The gum is shipped chiefly to Bordeaux the quantity annually imported into France being from 1½ to 5 millions of kilogrammes. It is usually of a yellowish to reddish colour occurring in larger lumps than Turkey gum roundish or oval or even elongated pulverisable and less brittle than Turkey gum. It is not very much used in England and may be distinguished from Turkey or Kordofan gum by the absence of the numerous fissures so characteristic of the latter the masses being in consequence firmer and less easily broken.

**Turkey Gum
276**

2nd —**Kordofan or Turkey Gum**.—This is also ascertained to be a pure form of the gum from **A Senegal**, the *Hashab* of East Central Africa. It comes from the mountainous tracts of Kordofan on the Upper Nile (between Nubia and Sennaár) and almost in the same latitude as Senegal although across the vast continent of Africa to the north eastern division. It is calculated that about 30 000 cwts of this gum are annually collected in Kordofan. The most valuable kind of Kordofan gum comes from the province of Debara and is known as *Hashabi*. This is generally conveyed down the Nile to Egypt and thence exported to Europe. It occurs in rounded lumps often as large as a walnut or in irregular broken pieces pure white very much fissured specially upon the surface. This is the gum most frequently used for medicinal purposes and may in fact be regarded as the true officinal Gum Arabic of England India and America. It is in fact the only gum which should be used for medicinal purposes. It

A 276

| The True Gum Arabic | ACACIA Senegal |
|--|---------------------------------------|
| <p>is chiefly imported into Europe from Alexandria and the neighbouring ports hence the commercial name Turkey gum</p> | |
| <p>3rd — Suakim Gum — There are in addition to the above several inferior forms of gum obtained from North East Central and North East Africa exported from Alexandria and occasionally met with in the London marts Amongst these may be mentioned the Sennaar gum known as <i>Hashab-el-Jesire</i> the gum from the eastern territories of the Blue Nile and from the mountain tracts between Khartoum and Berber From being exported from Suakim to Alexandria these are collectively known as Suakim gum Talca or Talka gum Suakim Gum is supposed to be obtained from A Seyal, var fistula, and A stenocarpa It generally exists in the form of a powder or in a semi pulverulent state owing to its being very brittle It is a very inferior variety of gum</p> | <p>Suakim Gum 277</p> |
| <p>4th — Barbary or Morocco or Mogador Gum — This brown coloured gum is obtained from Morocco and the northern provinces or brought to Mogador from Fezzan or by caravans from Timbuctu It is now pretty well determined to be the produce of A arabica Willd (A Nilotica, Desf) The tree is said to bear the vernacular name of <i>attaleh</i> and the gum is reported to be collected when the weather is hot and dry (July and August) It has a faint smell and when fresh constantly produces a crackling noise It is usually of a brownish colour and found in small angular or broken pieces</p> | <p>Barbary Gum 278</p> |
| <p>5th — East Indian Gum — This is perhaps the most abundant gum in England and America and is applied to industrial purposes It is generally a mixture of gums and chiefly from the following species A Senegal Willd, A stenocarpa, Hochst, A fistula, Schweinf and A arabica Willd (= A Nilotica, Desf) It is imported into Bombay from the Red Sea ports from Aden and the east coast of Africa It is re exported to Europe from Bombay under the name of Indian or East Indian gum Dr Dymock speaking of Bombay says there are two kinds met with in this market <i>vis maklar</i> in large round tears or vermicular pieces white yellow or reddish much like gum Senegal but more fissured (it derives its name from Makalla) and <i>maswai</i> in angular fragments and vermicular pieces fissured white yellow or reddish which derives its name from the port of Massowa Both of these are good soluble gums and if carefully sorted not much inferior to Kordofan gum In the year 1872 73 Bombay imported 14 352 cwt of East Indian gum valued at Rs 29 627 and re exported 4 625 cwt valued at Rs 78 898 Ten years later the imports into Bombay were only 8 691 cwt valued at Rs 13 028</p> | <p>East Indian Gum 279</p> |
| <p>6th — Cape Gum — This is produced at the Cape Colony from A horrida, Willd the <i>Durnbum</i> or <i>Witledurn</i> of the Colonists—the commonest tree of South Africa The gum is pale yellow or amber brown and is regarded as inferior</p> | <p>Cape Gum 280</p> |
| <p>7th — Australian Gum or Wattle Gum — This is chiefly derived from A pycnantha Benth and A decurrens, Willd It occurs in hard elongated or globular pieces varying in colour from dark amber to pale yellow It is very adhesive and is said not to be liable to crack The bark is very astringent and seems to impart this property to the gum From the preceding sketch of the commercial substances known as gum arabic it will be seen that they vary very much but that the Kordofan form of the gum from A Senegal is the purest and most valuable and is the Gum Arabic of Pharmacy</p> | <p>Wattle Gum. 281</p> |
| <p>HISTORY OF GUM ARABIC</p> <p>Gum arabic would appear not to have been known to the Sanskrit authors The Persian and Arabic writers describe it under the name of <i>Samgh i arabi</i> (<i>Dymock</i>) From the very remotest antiquity gum was</p> <p style="text-align: right;">A 282</p> | <p>282</p> |

ACACIA
Senegal

The True Gum Arabic.

known to the Egyptians. It is frequently mentioned by the ancient writers and there are numerous representations both of the plant and of the gum itself. The Egyptian fleet brought gum from Aden in the early part of the 17th century B C. The word *Kami* is the original of the Greek *Koμμi*, whence through the Latin *gummi* the English word gum was derived (*Fluck and Hanb Pharmacog*). Gum was used by the Arabian physicians but in the 12th century it was apparently unknown in Europe. It first reached Europe in 1340 A D through Italian merchants trading with Egypt and Turkey and by the Portuguese in 1449 it became a regular article of trade from the west coast of Africa.

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CHEMICAL COMPOSITION

Important Characters —§ Gum Acacia or *Arabic* is a type of gum found in the juice of various plants and especially in the genus ACACIA. Chemically gum Acacia consists of *Arabic Acid* ($C_{12}H_{22}O_{11}$) in combination with lime potash and magnesia. By the action of dilute sulphuric acid *Arabin* is converted into *Arabinose* a crystalline principle which is sweet and which has the same composition as grape sugar. By the action of dilute nitric acid mucic acid and saccharic acids are obtained. Gum arabic is soluble in water but insoluble in alcohol. Another variety of gum is known of which gum tragacanth may be mentioned as a type which does not dissolve in water but merely swells up to a soft gelatinous mass. Gums of this latter class contain a principle named *Bassorin* or *Tragacanthine*. Gums sometimes resemble resins physically but are distinguished by dissolving or softening in water and by being insoluble in alcohol while resins are unaffected by cold water but are more or less completely soluble in alcohol (*Surgeon C F H Warden Prof of Chemistry Calcutta*).

Gum dissolves slowly in an equal weight of water without affecting the thermometer, and forms a thick glutinous liquid which possesses a distinctly acid reaction. This property is but slightly accelerated at higher temperatures. Gum is insoluble in alcohol and most other liquids. An aqueous solution of gum if poured into glycerine becomes intimately mixed and this mixture may be evaporated to a thick jelly without any separation taking place. Dry lumps of gum are however insoluble in glycerine. Gum undergoes no change by age if kept dry but if prepared with warm water its disposition to sour is increased. The solution does not however ferment upon the addition of yeast but chalk and cheese start in it a fermentation which gives origin to lactic acid and alcohol but not to mannite or glycerine.

Arabic Acid
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To separate *Arabic Acid* or *Arabin* acidulate slightly a solution of gum with hydrochloric acid and add alcohol when the Arabin will be precipitated. Calcium chloride upon a dialyser will also separate this substance from the acidulated solution. An Arabin solution differs from a solution of gum in not being precipitated by alcohol but if the Arabin precipitate obtained from the acidulated solution be removed by means of a filter and dried it will be found that it has lost its solubility and cannot be dissolved even in boiling water. It has by the action of heat been changed into metagummic acid a substance identical with *Cerasin* found in beet and in cherry gum or in the series of the Tragacanth or Bassora gums.

Upon a chemical examination of the different kinds of commercial gum **Masing** found that their botanical sources could not by that means be ascertained. He also observed that the value of a gum is better judged of from its solubility than from its colour. He noted that the percentage of ash varied but little while the degree of alkalinity varied considerably being chiefly due to lime. **Fremy** first called the attention of chemists to the

Alkalis of
Gum
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A 285

Chemical Composition

ACACIA
Senegal.

peculiar relation between the organic substance of a gum and its mineral ash. The importance of his investigations lay in their physiological bearings upon the relation of the gum to the plant itself. If Arabin which has by heat been rendered insoluble (converted into metagummic acid) be next subjected to the influence of an alkali it is at once converted into a soluble gummy substance which differs in no essential from natural gum. It is thus concluded that gum is a salt of lime with Arabic acid or a mixture of such alkaline salts—magnesia and potash being frequently found in gum ash in addition to lime. Gum is thus viewed as a salt containing an overwhelmingly larger proportion of the organic acid than of the alkaline base since 3 per cent is about the largest proportion of lime detected. Although small the percentage of alkali is however exceedingly constant—a fact which would seem to justify Fremy's conclusion that the formation of gum by the plant depends upon an important function and is not accidental the product eliminated being most probably the organic acid which on escaping from the structure of the plant obtains its alkalis from the cell wall and is thus reduced to the saline condition.

Dr Graeger found that gum dried in the air contains 85.25 per cent of organic matter 3.15 of ash and 11.60 of water. The ash was found in three experiments to contain the average of 48 per cent of lime 18 of magnesia and 34 of potash. It still remains to be explained why the Basora group of gums merely swell when placed in water instead of being dissolved.

Detection of Gum.—Neutral acetate of lead does not precipitate gum arabic mucilage but the basic or sub acetate forms even in a very dilute solution a precipitate of definite constitution (*Fluck and Hanb Pharmacog*). A gum solution is rendered turbid by silicates borates and ferric salts but it is unaffected by silver salts mercuric chloride and iodine. Acted upon by nitric acid mucic acid is produced from gum and also a little oxalic acid.

Kilian has recently shown that *Arabinose* the sweet substance obtained from gum arabic by the prolonged action of dilute sulphuric acid is identical with lactose obtained from milk sugar. Gum may be distinguished from dextrine by the following tests—

1st—It contains no dextro glucose a substance present in dextrine and recognised by the copper test (Fehling's solution)

2nd—Gum contains a lime compound detected by the milky action of oxalic acid

3rd—Gum gives a yellow precipitate with ferric salts

Substitutes and Adulterations.—The *Indian Pharmacopœia* recommends the gum of *Feronia Elephantum, Corr* as a good substitute. It forms small rounded tears transparent frequently stalactitic colourless yellow or reddish. It is soluble in two parts of water forming a tasteless mucilage and much stronger than a gum arabic solution of the same proportions. It is chemically however considerably different from true gum arabic. It is precipitated by neutral acetate of lead or caustic baryta but not by potash in this reaction it resembles Tragacanth which unlike gum arabic yields an abundant precipitate with neutral acetate of lead.

The gum from *Prosopis glandulosa, Torrey* a tree successfully introduced into the North West Provinces by the Department of Agriculture and Commerce (nearly allied to the Panjáb species *P. spicigera, Linn*) yields a gum sometimes used in America as a substitute for gum arabic, and known there as Mezquit Gum (*Dr Charles Rice New York*).

The adulterations are chiefly mixtures of other less valuable gums and, indeed, so frequently is this the case that for pharmaceutical purposes it is desirable that the gum should be picked and assorted and

Ash of Gum
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**ACACIA
Sundra****Catechu yielding Species**

each fragment cleansed from mechanical impurities Flour or starch is often mixed with powdered gums but this may readily be detected by the blue reaction with iodine *Dextrin* is also often used as an adulterant but this may be at once detected by the tests already given Sand and other non gummy substances are sometimes mixed to increase the weight taking advantage of the presumption that these will be viewed as mechanical and accidental

THE DYE

Large quantities of gum arabic are used for giving lustre to crape and silk and for thickening colours and mordants in calico printing for suspending tannate of iron in the manufacture of ink and blacking

MEDICINAL USES

The gum is used in medicine as a demulcent and emollient Taking advantage of its viscosity it is used *externally* to cover inflamed surfaces such as burns sore nipples &c and it blunts the acrimony of irritating matters by being blended with them The powdered gum has also been found useful in checking hæmorrhage from leech bites and when blown up the nostrils it arrests severe epistaxis *Internally* it has been found useful in inflammations of the gastric and intestinal mucous membrane If held in the mouth in the form of a special preparation the gum is found serviceable in allaying cough thus affording relief Its influence as a demulcent is supposed to extend even to the urinary organs Gum has also been recommended as a substitute for amylaceous food in diabetes since it is not converted into sugar but it does not appear to have been attended with any appreciable benefit

Acacia sirissa, *Buch* Syn for *Albizzia Lebbeck*, *Benth*

A. speciosa, *Willd* , Syn for *Albizzia Lebbeck*, *Benth*

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A. Suma, *Kurz Mss in Brandis For Fl*, 187 *Fl Br Ind II*, 294
Bedd Fl Sylv, t 49

Syn—*MIMOSA SUMA Roxb*

Vern—*Sai kanta* BENG *Kumtia PERTABGARH Dhaula khejra* (White Acacia) BANSWARA *Gorodo MANDEVI Sonkarri DANGS Tella sandra* TEL *Mugalisoppu* (IN MYSORE) *bannu mara mugli* KAN

Habitat—Common in Bengal Behar the Western Peninsula Ava and Ceylon

Botanic Diagnosis—A medium sized tree with *white bark* and downy branchlets *spines* in pairs short hooked *Leaves* with 20 40 pinnæ and 60 to 100 leaflets *rachis* $\frac{1}{2}$ feet long densely downy with a large basal gland and several glands between the upper pinnæ *Corolla* nearly white scarcely exceeding the canescent *calyx* *Pod* 3 4 inches by $\frac{1}{2}$ to $\frac{3}{4}$ inch thicker than in **A Catechu**, veined distinctly beaked strap shaped narrowed suddenly into a stalk $\frac{1}{2}$ to $\frac{3}{4}$ inch long

Compare with **A Catechu**

Gum—The extract Catechu is said to be made from the heartwood of this tree (*Brandis* 188)

Tan—The bark is peeled off and used as a tan (*Brandis*)

Structure of the Wood—The wood resembles that of **Acacia Catechu**, but has smaller and more numerous pores and finer and more numerous medullary lays

A Sundra, *DC Fl Br Ind II* 295 *Bedd Fl Sylv*, t 50

Vern—*Lal khair* MAR *Kempu khairada shemi* KAN *Nalla san dra sandra, darisanchari* TEL *Karangalli бага* TAM *Bannu* (in MYSORE) KAN

A 295

**DYE
Gum
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**MEDICINE
The Gum
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**CATECHU
292
TAN
The Bark
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TIMBER
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The Acalypha

ACALYPHA
brachystachya

Habitat.—Found in the Western Peninsula Ceylon and Upper Burma
Botanic Diagnosis—The *Flora of British India* remarks This is scarcely more than a variety of *A. Catechu* from which it differs by its fewer leaflets and pinnæ and by the total absence of pubescence and in the dark brown colour of its branchlets

Compare with *A. Catechu*

Properties and Uses—

Gum—It yields Catechu of good quality

Structure of the Wood—Dark red rather close grained durable very heavy not attacked by insects Much like *A. Catechu* and when seasoned weighs about 80 lbs per cubic foot (*Bomb Gas XV Part 1 p 60*)

Oleghorn says it is used for posts and rice pestles The supply is rather large and abundant but the wood is not generally to be obtained in the market in planks of any size At Guntur **Mr Rohde** states that posts 5 feet long are procurable at ₹12 per 100 These are well suited for fencing though the non elastic nature of the wood is unfavourable to the holding of nails driven into it The natives regard it as the most durable wood for posts in house building (*Cleghorn's For and Gard S Ind 223*)

CATECHU
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TIMBER
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Acacia tomentosa, Willd *Fl Br Ind II 294*

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Habitat—A small tree of the Western Peninsula and Ceylon very common in the Panch Mahāls and Gujarat where it is known as *anjār*

A. umbraculata, Wall Syn for *A. Latronum*, Willd

A. vera, Willd see *A. arabica* Willd; and for the true Gum Arabic see *A. Senegal*, Willd

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A. vera may be described as the hypothetical species to which the true gum arabic was attributed before the plants which yielded that product were definitely determined

ACALYPHA, Linn *Gen Pl III, 311*

301

A genus of shrubs (belonging to the Natural Order EUPHORBIACEÆ) having alternate ovate 3 5 or pinnivened leaves with long petioles often in cultivation variously coloured or marked chiefly in shades of yellow to dark red Flowers in axillary simple racemes or spikes apetalous and monœcious or diœcious Male calyx usually 4 partite valvate Stamens indefinite (rarely 8) attached to an elevated receptacle filaments free compressed attenuate at the apex anthers inserted below the apex cells often free Female flowers in spikes hid within the axils of bracts solitary or 2 3 cymose sessile Bracts much varied in form usually dentate variously evolute and in most species accrescent more or less covering the fruit Female calyx 3 4 partite subchavate Ovary 3 locular cells (two anterior) 1 ovuled Style 3 distinct or shortly connate at the base Capsules 3 often echinate or rugose (Compare with *Baillon V 212*)

A large genus comprising some 220 species mostly American but more or less distributed over all tropical and sub-tropical countries In India there are some six or eight unimportant species The name of the genus was originally *Acalépha* from *εκαλος* unpleasant and *ήφη* touch or *ακαληφη* the nettle

Acalypha brachystachya, Horn Hort DC Prod, XV, II, 870

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Syn.—*A. CONFERTA* Roxb *Fl Ind Ed CBC 686* *A. CALYCFORMIS* Wall Cat

Habitat.—A small bush little over a foot in height met with on the Himālaya and the Nilgiri Hills

A 302

ACALYPHA
indica**The Birch-leaved Acalypha.**

Botanic Diagnosis — *Leaves* round cordate long petioled three-nerved *Spikes* sessile aggregated together *male flowers* minute, purplish, forming a head within the exterior involucre *female flowers* two or three within each involucre *Bracts* crowded sessile proliferous

- 303 **Acalypha ciliata**, Mull Arg DC Prod XV, II, 873 Roxb, Fl Ind, Ed C B C 686

Habitat — A common annual plant throughout the plains of India most plentiful in the Western Peninsula where it almost takes the place of *A. indica*, Linn to which it is nearly allied

- 304 **A. fruticosa**, Forsk, DC Prod XV, II, 822 Kurz, For Burm, II, 397 **A. amentacea**, Roxb Fl Ind Ed C B C, 686 **A. betulina**, Retz Ainslie Mat Ind, II, 388 Drury Us Pl, 10

THE BIRCH LEAVED ACALYPHA

Vern — *Sinni marum* TAM *Chinni-ká jhar* DUK, *Chinni áka* chinns TEL

Habitat — A bush 4 8 feet high leaf shedding met with in South India—Madras Pondicherry Mysore and the Carnatic Ceylon Burma—frequent in the tropical forests of Pegu Yomah and Martaban up to 2 000 feet in altitude Moluccas

Botanic Diagnosis — *Leaves* ovate oblong deeply serrate acute to long acuminate 3 or almost 5 nerved tomentose beneath on a long petiole *Flowers* minute green clustered sessile forming slender puberulous spikes occurring singly or 2 3 above the scars of fallen leaves the *female flowers* at the very base of the spike or on separate small axillary spikes *Styles* simple many-cleft about 2 3 times longer than the floral bracts *Flowering time* the beginning of the hot season

MEDICINE
Leaves
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Medicinal Properties and Uses — The LEAVES are much esteemed by the native practitioners who prescribe them as a grateful stomachic in dyspeptic affections and in cholera they are besides considered as attenuant and alterative and are accordingly administered when it is necessary to correct the habit The dose of the infusion of the leaves as ordered by the Vytians is half a tea-cupful twice in the day (Ainslie Mat Ind II 388)

- 306 **A. indica**, Linn

Syn — *A. SPICATA* Forsk *A. CILIATA* Wall Cat No 7779 and *A. CANESCENS* Wall Cat No 7785

Vern — *Kuppi khokali* or *khokli* HIND BOMB *Khokli khágoti* MAR *Vanchhi kanto* GUJ *Muktajuri shwet busunta murkanta* BENG *Indra-maris* URIYA; *Arittamunjayrie*? SANS *Kuppamen* TAM *Kuppav-chettu murkanda chettu* or *murukonda* (GODAVARI) *pappanti marupendi harita-manjuri* TEL *Chalmari kuppi* KANARA *The Cupamen* of Rheed Mal X 161 t 81 83 *Kupamenya* CINGH

References — *Roxb Fl Ind Ed C B C* 685 *DC Prod XV II* 868 *Pharm Ind* 205 *Ainslie Mat Ind II* 161 *O Shaugh Disp* 562 *Balf Cycl I* 19 *Bidie Cat Paris Exh*, 1878 42 *Dymock Mat Med W Ind* 587

Habitat. — A small annual shrub (1 2 feet in height) occurring as a troublesome weed in gardens and road sides throughout the plains of India, flowering all the year

Botanic Diagnosis — *Leaves* scattered, ovate cordate, 3 nerved serrate smooth, about 2 inches long and 1½ broad *petiole* as long as the blade *Spikes* axillary generally single peduncled erect, as long as the leaves, many flowered crowned by a cross shaped body, the base of which is surrounded with a three leaved *calyx* From the base of this cross-

Special Opinions.

ACALYPHA
indica

shaped body issues a style having a stigmatic fringe Male flowers numerous crowded around the apex of the spike

Medicinal Properties and Uses.—"The ROOTS LEAVES and TENDER shoots are all used in medicine by the Hindús The powder of the dry leaves is given to children in worm cases also a decoction prepared from the leaves with the addition of a little garlic The juice of the same part of the plant together with that of the tender shoots is occasionally mixed with a small portion of margosa oil and rubbed on the tongues of infants for the purpose of sickening them and clearing their stomachs of viscid phlegm The *hakims* prescribe the *koopamaynee* in consumption (*Ainslie Mat Ind II 161*) The leaves with garlic are regarded as anthelmintic mixed with common salt the leaves are applied externally in scabies and the juice rubbed up with oil is used externally in rheumatism (*Balf Cycl*) According to *Rheede* the root is used as a purgative on the Malabar Coast (*Hort Mal X 161*) This property is confirmed by *Dr H E Busted* who has used it as a laxative for children A contributor in *Dacca* informs me he uses it as a laxative and in an official correspondence with the Government of India *Rai Kanai Lal De Bahadur*, includes the *muktajhuri* amongst emetics In *Bombay* the plant had a reputation as an expectorant hence the native name *khokli* (cough) (*Dymock Mat Med W Ind 588*) *Dr George Bidie* furnishes the following remarks The expressed juice of the leaves is in great repute, wherever the plant grows as an emetic for children and is safe certain and speedy in its action Like *Ipecacuanha* it seems to have little tendency to act on the bowels or to depress the vital powers and it decidedly increases the secretion of the pulmonary organs Probably an infusion of the dried leaves or an extract prepared from the green plant would retain all its active properties The dose of the expressed juice for an infant is a teaspoonful (*Pharm Ind*) A decoction of the leaves is given in earache a cataplasm of the leaves is applied as a local application to syphilitic ulcers and as a means of relieving the pain of snake bite (*Drury*) According to *Nimmo* the roots attract cats quite as much as those of valerian (*Voigt 160 Treasury of Botany*)

§ Much used by Mahomedan practitioners in treating cases of acute mania in early stage The fresh juice (3i) with (6 gr) chloride of sodium dissolved in it and dropped in both nostrils every morning followed by cold shower baths for three mornings regularly proves highly successful Thus it is supposed by them to act as a brain purge so called probably owing to a quantity of mucus and other matter escaping from the nostrils immediately after the application of the above recipe I have given it internally it acts as an anthelmintic and laxative (*Surgeon E W Savage Rajamundry Godavery District*) Juice of the fresh plant emetic laxative dose one to four drachms according to age Fresh leaves ground into a paste made into a ball to the size of a large marble and introduced into the rectum very useful in relieving obstinate constipation of children (*Apothecary Thomas Ward Madanapalle Cuddapah*) The juice or the bruised leaf is applied to the skin to allay the irritation caused by the bite of the centipede (*Surgeon Ruthnam T Moodelliar Chingleput, Madras Presidency*)

The juice of the fresh leaves mixed with lime is applied topically in painful rheumatic affections (*Surgeon Major John Lancaster M B Chittore*) Used in scabies and ringworm also internally as a carminative (*Surgeon Major F F L Ratton M D, Salem*) The root possesses purgative properties the leaf juice is a safe useful emetic especially adapted for children (*Surgeon Major F M Honston Travancore, and John Gomes Travandrum*) "The juice of the fresh plant

MEDICINE

Roots
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Leaves
308
Shoots
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A. 311

**ACAMPE
papillosa****Rasna**

is given to children as an emetic in $\frac{3}{4}$ to $\frac{3}{1}$ doses (Apothecary *J Norman Chattrapur Ganjam*)

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This plant is called in Kanara *chalmari* as well as *kúppé* (the latter word means a heap the plant being found in waste places and rubbish heaps) The natives use it in congestive headaches a piece of cotton is saturated with the expressed juice and inserted into each nostril relieving the head symptoms by causing hæmorrhage from the nose The powder of the dry leaves is used in bed sores and wounds attacked by worms In asthma and bronchitis I have employed it with benefit both in children and adults

313

Mode of preparation—Macerate 3 oz of the fresh leaves stalks and flowers with a pint of spirits of wine in a closed jar for 7 days occasionally agitating the same Strain press filter and add sufficient spirits of ether to make one pint

314

Physiological effects—In small doses it is expectorant and nauseant in large doses emetic

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"Dose"—Minims 20 to 60 frequently repeated during the day in honey (*Surgeon Major E H R Langley Bombay*) One drachm of the expressed juice of the fresh leaves is an easy and rapid emetic in children The bruised leaves are useful as an application to maggot eaten sores (*Surgeon W D Stewart Cuttack*)

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The root bruised in hot water is employed as a cathartic and the leaves as a laxative in decoction mixed with common salt The leaves are used in scabies and mixed with chunam in other cutaneous diseases (*Drury*) (*Surgeon H W Hill Manbhum*)

ACAMPE, Lindl Gen Pl III, 579**317****Acampe papillosa Lindl ORCHIDÆE**

Syn—*SACCOLABIUM PAPILLOSUM Lindl*

Vern—*Kanbher MAR Rasna gandhanakuli SANS The Drug Rasná HIND BENG BOMB*

MEDICINE**318**

Medicine—This plant is said by **U O Dutt** to be used indiscriminately with the **Vanda Roxburghii**, the roots of both constituting *rasna* BENG and SANS also *gandhanakuli* **Acampe** is a native of the coast of Burma and South India and is not met with in Bengal

Acampe differs from **Vanda** in having small brittle flowers with a lip adnate to the edges of the column sepals and petals thick concave racemes short rigid crowded upon a short simple peduncle **Dr Dymock** includes both the above plants as yielding the *rasna* and says the bazar drug comes from Kathiawar The comparatively limited distribution of **A papillosa** as compared with **Vanda Roxburghii** should assist in determining which of these plants is the true *rasna*

It seems probable that the roots of two or three distinct orchids are indiscriminately used as *rasna*—i.e. **Acampe papillosa** **Vanda Roxburghii** and **Vanda Wightiana** **U O Dutt** gives as follows a popular prescription for rheumatism in which *rasna* is one of the ingredients—

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Rasna panchaka—Take of *rasna gulanicha devdaru* ginger and the root of the castor oil plant in equal parts and prepare a decoction in the usual way This is apparently a popular prescription for rheumatism being mentioned by most writers

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§ Special Opinions—This orchid is very common in the Konkan its roots are considered to have cooling properties and are used medicinally as *Rasná* (*Surgeon Major W Dymock Bombay*) I found the **Acampe papillosa** in the mango-groves of Malda It is a common parasite on the mango tree and flowers in the rainy season when it can readily be

The Natural Order Acanthaceæ

ACANTHACEÆ

distinguished from allied species (U C Dutt Civil Medical Officer Serampore)

It is said to be a specific for acute rheumatism. It is invariably given internally as a substitute for Sarsaparilla. There are three preparations in use. The first is called *Rasnā panchak* and is prepared by boiling together equal parts of *rasnā dewadara* ginger *garula* and castor root and water 8 oz. This decoction is prescribed extensively for cases of acute rheumatism. The second preparation or *Rasna suptaka* has seven ingredients and is given to cases of lumbago sciatica, and neuralgia. Prepared by boiling together equal quantities of *rasna gokharu* castor root *dewadara poonarnawa goilwel* pulp of *babawa* and ginger. The third preparation is named the great *Rasna* (*Bara rasna*) and is considered a specific remedy for rheumatic and nervous affections paralysis secondary syphilis and uterine diseases. It has the peculiar power of preventing abortions and miscarriages. The ingredients of the decoction are *rasna* two parts *dhumasa chiknamula* one part castor root one *dewadara* one *kuchora vekhanda* one *adulasa* one ginger one small *hirda* one *chuwak* one *nagar motha* one *punarnawa gulawel* one *wardhara* one *budishep* one *gokhroo asandha* one *ativish* one pulp of *bahawa sutawari* one *pimplee* one *kolista* one coriander one *ringnee* one and *moti ringnee* one (Surgeon W Barren Bhuj Cutch, Bombay)

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ACANTHACEÆ, CXXII Gen Pl

322

The name of a large and important Natural Order of herbs and shrubs (rarely trees) comprising about 1500 species almost exclusively inhabitants of the tropical and warm temperate regions of the Old World. Indeed the gregarious sub bushy or herbaceous under vegetation of damp tropical forests may be regarded as at least one third composed of Acanthaceous plants. Over 400 species are met with in India 154 of which according to *Flora of British India* are referred to the genus *STROBILANTHES*. Only a few species occur in the temperate zones and none in the alpine or arctic regions.

This Natural Order belongs to the Cohort *PERSONALES* or plants having a monopetalous hypogynous and chiefly 2 labiate *corolla stamens* generally 4 two long and two short (*didynamous*). *Ovary* 1-2 rarely 4 celled *Fruit* capsular. In this cohort are placed the following Natural Orders SCROPHULARINÆ VERBENACEÆ LENTIBULARIÆ OROBANCHACEÆ GESNERACEÆ BIGNONIACEÆ ACANTHACEÆ and PEDALINÆ.

Diagnostic characters of the Acanthaceæ — *Leaves* opposite exstipulate. *Flowers* aggregated into compact bracteated *spikes* (sometimes solitary as in some *THUNBERGIEÆ*). *Corolla* imbricate or twisted in æstivation bilabiate rarely sub regular. *Stamens* often reduced to two. *Ovary* 2 celled *ovules* one or more in each cell 1 to 2 seriate anatropous. *Capsule* dehiscent loculicidal *valves* often elastically recurving and carrying the seeds attached to the septa. *Seeds* 2 seriate along the *septum* and each (except in *THUNBERGIA*) seated upon a sharp up curved hook like process from the placenta (called the *retinacula*) ovoid or compressed *testa* smooth or warted rarely hispid. *Albumen* none.

This Order has its nearest affinities in SCROPHULARINÆ BIGNONIACEÆ and VERBENACEÆ. The bracteated spike contorted æstivation and the presence of retinacula will unerringly separate it however from these Orders. Indeed the dark greenish blue and more or less glabrous condition of the foliage with many approximately parallel veins when taken along with the bracteated spikes will be found to possess something so characteristic and impressive that if this feature be once carefully observed it is not again readily mistaken.

For the analysis and diagnostic characters of the genera and species of this Order reference should be made to the *Flora of British India Vol IV* 388 from which the following classification into Tribes has been extracted for the convenience of the general reader —

Tribe 1, Thunbergiæ. — Scandent or twining. *Calyx* minute annular

ACANTHUS
ilicifolius.**Acanthaceæ.**

or 10-15 toothed *Corolla lobes* twisted in bud *Ovules* 2 in each cell *col*
lateral capsule beaked *retinacula* 0

Genus—*Thunbergia*

Tribe 2, Nelsoniæ—*Corolla lobes* imbricate in bud *Ovules* many
superimposed in two rows in each cell *Seeds* small seated on minute
papillæ not on hard *retinacula* obscurely albuminous

Genera—*Flytraria* *Nelsonia* *Ebermaiera* *Ophiorrhiziphyllum*

Tribe 3, Ruelliæ—*Corolla lobes* twisted to the left in bud *Seeds* on
retinacula *Sepals* 5 or 4 with one larger *Anthems* usually 2 celled
cells parallel or one a little below the other *Style* 2 fid one lobe often sup
pressed

Sub-tribe 1 **POLYSPERMÆ**—*Ovules* 3 to 12 in each cell
Capsule normally 6 or more seeded

Genera—*Cardanthera* *Hygrophila* *Nomaphila* *Ruellia* *Echinacan*
thus *Æchmanthera* *Hemigraphis* *Stenosiphonium*

Sub-tribe 2 **TETRASPERMÆ**—*Ovule* 2 in each cell *Capsule*
4 or fewer seeded

Genera—*Strobilanthes* *Calacanthus* *Calophanes* *Dædalacanthus*
Phayloopsis *Petalidium*

Tribe 4, Acanthæ—*Corolla tube* short upper lip obsolete lower 3
lobed *Ovules* 2 in each cell *Retinacula* curved hardened

Genera—*Blepharis* *Acanthus*

Tribe 5, Justiciæ—*Corolla lobes* imbricate in bud *Retinacula* curved
hardened *Anthems* 2 1-celled cells often spurred at the base one
frequently placed much above the other *Style* shortly equally 2 fid or
sub-entire

Sub-tribe 1 **ANDROGRAPHIDÆ**—*Ovules* 3 10 in each cell
Capsule normally 6 or more seeded

Genera—*Andrographis* *Haplanthus* *Gymnostachyum* *Phlogacanthus*
Cystacanthus *Diotaanthus*

Sub-tribe 2 **BARLERIÆ**—*Ovules* 2 1 in each cell *Corolla*
lobes 5 sub equal *Stamens* 4 of which 2 are small or obsolete or 4
1-celled

Genera—*Barleria* *Neuracanthus* *Crossandra*

Sub-tribe 3 **ASYSTASIÆ**—*Ovules* 2 in each cell *Corolla-*
lobes 5 sub equal *Sepals* 5 small sub equal *Stamens* 4 or 2 anther
cells 2 sub equal parallel muticous

Genera—*Asystasia* *Eranthemum* *Codonacanthus*

Sub-tribe 4, **EJUSTICIÆ**—*Ovules* 2 in each cell *Corolla*
distinctly 2 lipped

Genera—*Lepidagathis*, *Phalacanthus* *Monothecium* *Clinacanthus*
Hypoestes *Rungia* *Dicliptera* *Peristrophe* *Justicia* *Adhatoda* *Rhina*
canthus *Dianthera* *Ptyisglottis* *Sphinctacanthus* *Ecbolium*, *Grapto-*
phyllum

ACANTHUS, Linn Gen Pl, II, 1090

A genus of herbs belonging to the **ACANTHACEÆ** characterised by having
the upper lip of the *corolla* obsolete lower 3 lobed *Anterior filaments* without
an excurrent process *Ovules* 2 in each cell

It contains 7 Indian species none of which are of any great economic
value all are confined to the warm forests of the Eastern Peninsula. **A**
spinosa is found in Italy Spain and the south of France and is supposed
to have suggested the idea of the decoration of columns in the style now
known as Corinthian architecture

Acanthus ilicifolius, Linn Fl Br Ind IV, 481 Wight Ic, t 459
Vern—*Harcuch kanta* BENG *Harikusa* SANS *Kaya* BURM

Habitat.—A common plant growing everywhere near the coast, from

Maple-Sugar

ACER

the Sunderbuns to Malacca and one of the most characteristic plants in that region. It makes its appearance in the swamps around Calcutta Dum Dum &c

It does not appear to be put to any economic purpose, although it covers many miles of country

ACER

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A genus of trees with opposite, simple or palmately lobed exstipulate leaves (belonging to the Natural Order SAPINDACEÆ). Flowers regular polygamous formed into terminal and lateral racemes or corymbs. Calyx usually 5 partite imbricate deciduous. Petals of the same number as the sepals or absent shortly clawed and without scales. Stamens 4-12 usually 8 inserted on the glabrous disk generally shorter in the hermaphrodite than in the male flowers. Ovary laterally compressed 2 (rarely 3) lobed and celled cells 2-ovuled. Fruit an indehiscent double samara. Seeds exalbuminous.

A genus containing about 40 to 50 species found in Europe Asia and North America chiefly in the temperate zones. The name Acer is derived from the Latin *Acer* sharp or pointed (aigu Fr; acute eager Eng). A name applied in all probability by the Latin people to the members of this genus in allusion to the form of the leaves. This is the genus of the maple the sycamore and the plane tree of English authors. *A. Pseudo-platanus* is a native of Germany Switzerland Austria and Italy now largely cultivated in England it is the greater maple sycamore or plane-tree. *A. campestre* of England is the common maple. *A. saccharinum*, Wang is the common sugar maple of the Northern United States and of Canada. In addition to yielding sugar *A. rubrum*, the Swamp maple of Pennsylvania gives from its bark a dark blue dye made into ink.

MAPLE SUGAR (a form of Cane sugar)

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References—*Spons. Encycl.* 1902. *Fluck and Hanb. Pharmacog.* 721. *Smith's Dictionary of Economic Plants.* *Smith on Foods* 256. *U. S. Dispens.* 15th Ed. 1256. *Simmonds Comm. Prod. Veg. Kingdom* p. 205.

It would appear that either none of our Indian species of *Acer* yield maple sugar or that this property is quite unknown to the natives of our hill tracts where various species of maple are plentiful. This subject seems worthy of a little attention for there does not seem the slightest reason why the sugar yielding species could not be introduced into India. If they were found to take naturally to the soil and climate of Indian sub-alpine regions they might supply the poor hill tribes with the little known luxury of sugar they are however of no commercial value. Speaking of maple sugar *Spons. Encycl.* says. In sections of the United States where it has not been exterminated the manufacture of sugar and syrup from it is a remunerative adjunct to other farming industries, occupying a period in which little other farm work can be pursued. The apparatus for collecting the sap and manufacturing the sugar involves a very small investment the fuel consumed usually consists of the prunings of the maple grove which is benefited thereby and at least 90 per cent of the gross return is net profit.

The census of Pennsylvania for 1870 gives the following figures for maple sugar as manufactured in that State 1850 2 326 525 lbs 1860 2,768 965 lbs and in 1870 1 545 917 lbs and the United States as a whole are said to manufacture about 40 000 000 lbs annually the Indians manufacturing some 30 000 000 lbs in addition for their own consumption. Of this amount Vermont yields about 10 000,000 lbs, and New York

**ACER
caesium****The Species of Indian Maple.**

327

a somewhat larger quantity Canada manufactures about 10 000 000 lbs annually

In addition to the manufacture of sugar a large quantity of maple sap is consumed in the form of molasses

In Nebraska an equally good saccharine product is obtained from **A. Negundo**, *L* (*Negundo aceroides*, *Mærch*) From some investigations made in Illinois with reference to the value of this tree as a supply of sugar it was found (1) that trees 5 years old commence to yield and that an ordinary tree will yield more than one of equal size of the true maple-sugar tree (2) that the sap is richer in sugar the yield being 28 per cent to the weight of sap (3) that the sugar produced is whiter than that from the sugar maple These facts should recommend themselves to planters and it is probable this tree would succeed better in India than any of the preceding species

There are 13 species of **ACER** met with in India grouped into the following sections by the *Flora of British India* —

[Note — Those marked * will be found described further on]

SECTION I — LEAVES UNDIVIDED

† Leaves with 3 basal nerves

* 1 **A. oblongum**, *Wall* — Kashmir Sikkim Bhutan

2 **A. niveum** *Blume* — Leaves quite entire white glaucous beneath *Cymes* lax flowered glabrous cell not angular — Assam Moulmein Sumatra

* 3 **A. lævigatum**, *Wall* — Simla Sikkim, Khasia Hills &c

†† Leaves with 5 basal nerves

* 4 **A. sikkimense** *Miq* — Sikkim Bhutan

* 5 **A. Hookeri**, *Miq* — Sikkim Bhutan

6 **A. stachyophyllum**, *Hiern* — Leaves serrate *Carpels* 1½ to 2 in long *Cells* angular — Sikkim Bhutan

SECTION II — LEAVES 3 LOBED

7 **A. isolobum**, *Kurz* — Leaves deeply 3 lobed and nerved, glabrous shining acutely serrate lobes lanceolate acuminate — Pegu

8 **A. pentapomum**, *f L Stewart* — Leaves 3 lobed with tufts of hairs in the axils of the 3 5 nerved lobes ovate obtusely serrate Peduncles fascicled — Kashmir to Kumaon

SECTION III — LEAVES 5 LOBED AND NERVED (EXCEPT 3 LOBED FORM UNDER **A. villosum var **Thomsoni**)**

* 9 **A. caesium**, *Wall* — Kashmir to Nepal

* 10 **A. villosum**, *Wall* — Kashmir to Nepal

* Var **Thomsoni**, *Miq Sp* — Bhutan to Manipur

* 11 **A. caudatum**, *Wall* — Chumba to Sikkim

SECTION IV — LEAVES 7 TO 5 LOBED AND NERVED

* 12 **A. Campbellii**, *Hook* — Sikkim to Manipur

* 13 **A. pictum**, *Thunb* — Kashmir to Bhutan

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Acer caesium, *Wall Fl Br Ind, I, 695* SAPINDACEÆ

THE INDIAN MAPLE

Vern — *Trekhan tarkhana tulpattar mandar kauri kalindra salima, kansal* PB *Kanshin* THIBET *Jerimu shumanyra* SIMLA *Kilu, kainsung* KUMAON

References — *Brandis For Fl III Gamble, Man Timb 100.*

Habitat. — A large deciduous tree found in the North West Himalaya from the Indus to Nepal, between 7 000 and 11 000 feet

A 328

| Maple Timber | ACER Hookeri |
|---|-----------------|
| <p>Botanic Diagnosis —Leaves palmately 5 lobed pale glaucous beneath and almost quite glabrous except a few short hairs on the veins <i>Cymes</i> corymbose appearing after the leaves and becoming nearly as long <i>Fruit</i> black and quite glabrous carpels $1\frac{1}{2}$ to 2 in long wings venose, somewhat diverging cells angular black</p> | |
| <p>A large tree often 80 feet in height twigs red or bluish laterally compressed flowering in April and the fruit ripening in October</p> | |
| <p>Structure of the Wood —White or pale cream coloured with brown bands porous close grained less mottled than that of <i>A. caudatum</i>, soft to moderately hard annual rings distinct Weight about 40 lbs per cubic foot</p> | TIMBER 329 |
| <p>Scarcely used Drinking cups are sometimes made of it by the Thibetans</p> | DOMESTIC 330 |
| <p>Acer Campbellii, Hook f & Th Fl Br Ind I 696</p> | 331 |
| <p>Vern —Kabashi NEPAL Daom yatli LEPCHA Ailok BHUTIA Reference —Gamble Man Timb 100</p> | |
| <p>Habitat —A large deciduous tree found in the Sikkim Himálaya above 7 000 feet in altitude This is the chief Maple of the North East Himalaya</p> | |
| <p>Botanic Diagnosis —Leaves beautifully green 5 7 lobed sub membranous glabrescent except in the axils of the 5 7 nerves petioles red <i>Cymes</i> pyramidal or elongated sub glabrous appearing with the leaves</p> | |
| <p>Structure of the Wood —Greyish white moderately hard shining close grained Annual rings marked by a thin line Weight 38 lbs per cubic foot</p> | TIMBER 332 |
| <p>It is extensively used for planking and for tea boxes It reproduces freely either by seed or by coppice and plays an important part in the regeneration of the hill forests</p> | 333 |
| <p>A. caudatum, Wall Fl Br Ind I 695</p> | 334 |
| <p>Vern —Kansla kandaru kanjara SIMLA Khansing kabashi NEPAL Yalishin BHUTIA</p> | |
| <p>References —Brandis For Fl 112 Gamble Man Timb 100</p> | |
| <p>Habitat —A moderate sized deciduous tree with dark brown bark flowering in March and April met with in the Himalaya from the Chenab to Bhutan between 7 000 to 11 000 feet</p> | |
| <p>Botanic Diagnosis —Leaves 5 lobed, serrate nearly glabrescent except in the axils of the nerves lobes caudate the two basal ones small <i>Racemes</i> short <i>Carpels</i> $\frac{2}{3}$ to $1\frac{1}{2}$ inch long <i>Fruit</i> nearly glabrous wings pink or at length ferruginous <i>front</i> sinuous crenulate</p> | |
| <p>Structure of the Wood —White with a faint pink tinge shiny compact moderately hard sometimes with small masses of heartwood near the centre Annual rings distinct Weight 43 lbs per cubic foot</p> | TIMBER 335 |
| <p>A. cultratum, Wall</p> | |
| <p>A Synonym used by Baden Powell Pb Prod I 566 See <i>A. pictum</i> Thunb</p> | |
| <p>A. Hookeri, Miq Fl Br Ind I 694</p> | 336 |
| <p>Vern —Lal kabashi NEPAL Palé LEPCHA Reference —Gamble Man Timb, 99</p> | |
| <p>Habitat —A deciduous tree found in Sikkim and Bhutan above 7 000 feet Plants with copper-coloured foliage are not uncommon about Darjiling</p> | |

**ACER
pictum.****Maple Timber****TIMBER**337
338

Botanic Diagnosis—*Leaves* undivided finely duplicate serrate ovate caudate-acuminate base 5 nerved cordate, both sides green and sub glabrate *Racemes* puberulent simple nearly equal and appearing with the leaves *Fruit* glabrous *carpels* $\frac{1}{2}$ to $\frac{3}{4}$ inch long *wings* venose widening above and divergent *back* slightly curved

Structure of the Wood—Grey Weight 37 lbs per cubic foot

Acer lævigatum, Wall Fl Br Ind, I, 693

Vern—*Sasleni cherauni thali kabashi NEPAL Tungnyok LEPCHA*

References—*Brandis For Fl 110 Gamble Man Timb 99 Kurz For Fl Burm I, 289*

Habitat—A deciduous tree found in the Himalaya from the Jumna eastward to Bhután between 5 000 and 9 000 feet in the Khásia Hills, and in Tenasserim

Botanic Diagnosis—*Leaves* undivided quite entire or minutely serrate when young ovate oblong acuminate glabrous penninerved reticulate green on both surfaces base rounded three nerved *Cymes* panicked glabrous appearing with the leaves *Fruit* glabrous *carpels* 1 to $1\frac{1}{4}$ inch long *wings* venose slightly diverging widened above *back* curved

A handsome tree with broad, oval crown flowering in April and ripening its fruit in July and August Bark smooth yellowish, or dark ash coloured

Structure of the Wood—White shining hard close grained Weight 43 lbs per cubic foot

Used for planking and tea-boxes Much used in Nepal for building

TIMBER339
DOMESTIC

340

341

A. oblongum, Wall Fl Br Ind, I, 693

Vern—*Mark Pb Mharengala patangalia kirmoli N W P Pugila busimpala NEPAL*

References—*Brandis For Fl 110 Gamble Man Timb 99*

Habitat—A moderate sized deciduous tree found in the Himalaya from the Jhelum eastward to Bhután up to 6 000 feet in altitude

Botanic Diagnosis—*Leaves* undivided quite entire oblong ovate acuminate penninerved silvery glaucous beneath base obtuse 3 nerved *Cymes* panicked appearing with the leaves *Fruit* glabrous; *carpels* 1 to $1\frac{1}{4}$ inch long *wings* venose diverging contracted below *back* nearly straight cells woody angular clothed inside with white hairs

Never leafless the mature foliage of a deep dark green colour A gregarious tree flowering in February to April the fruit ripening in June to November

Structure of the Wood—Light reddish brown moderately hard close-grained Annual rings faintly marked Weight 45 lbs per cubic foot

Used for agricultural implements and drinking cups

TIMBER342
DOMESTIC

343

344

A. pictum, Thunb Fl Br Ind I 696

Syn—*A LÆTUM C A Mey, A TRUNCATUM Bunge A CULTRATUM Wall Pl As Rar*

Vern—*Tilpattar trekhan, tarkhana kakkru kansal kanjar, jarimu laur Pb Trikunda or trikanna MURREE Mandal maner CHUMBA Trekhan HAZARA Tian KANAWAR Kanchli N W P Dhadonjra SIMLA*

References—*Brandis For Fl 112, Baden Powell Pb Prod I 566 Gamble, Man Timb 101*

Habitat—A beautiful moderate sized tree, met with in the temperate Himalaya from Kashmir altitude 4,000 to 6 000 feet to Bhután altitude

A 344

Maple Timber

ACER
Thomsoni

9 000 feet A widely diffused species being distributed to Japan, China, the Caucasus Armenia and North Persia the type in these widely different countries constantly preserving itself It is the most abundant Maple in the Himálaya flowering in April and the fruit ripening in July and August

Botanic Diagnosis — *Leaves* 5 7 lobed glabrescent, except hairy tufts on the axils of the basal nerves cordate lobes lanceolate caudate entire green on both sides *Cymes* corymbose appearing with the leaves *Fruit* glabrous *carpels* $1\frac{1}{4}$ to $1\frac{3}{4}$ inch long divaricating almost in one line *wings* sinuous venose *back* arcuate *cells* compressed

Properties and Uses—

Medicine — The KNOTS on the stem are made into the curious water cups supposed by some of the hill tribes to have a medicinal influence over the water The LEAVES are said to yield an acrid juice in Kanáwar which blisters the hands but in most other parts of the Himálaya they are lopped off as fodder

Fodder — The branches are lopped for fodder

Structure of the Wood — Pinkish white soft to moderately hard, close grained fairly strong and elastic Weight 41 lbs per cubic foot

It is used for the construction of ploughs bedsteads and poles to carry loads Thibetan drinking cups are made of the knotty excrescences, in fact this is the species most frequently used for this purpose

Acer sikkimense, Miq Fl Br Ind I 694

Vern — *Palegnyok* LEPCHA

References — *Gamble Man Timb 99*

Habitat — A small tree found in the hills in Sikkim and in Bhután from 7 000 to 9 000 feet and in the Mishmi mountains

Botanic Diagnosis — *Leaves* undivided minutely serrate ovate cuspidate cordate penninerved with 5 basal nerves sub coriaceous glabrous green on both sides *Racemes* spicate and glabrate appearing with the leaves *Fruit* glabrous *carpels* $\frac{1}{2}$ to $\frac{3}{4}$ inch long *wings* venose diverging widened above *back* straight or slightly curved *cells* not angular

Structure of the Wood — Shining, grey annual rings distinct. Weight 37 lbs

A. Thomsoni, Miq Fl Br Ind I 695

Syn — *A villosum* Wall var THOMSONI in *Hook Fl Ind I 695*

Vern — *Kabashi* NEPAL

References — *Brandis For Fl 109*

Habitat — A large tree often 150 feet in height found in the hills in Sikkim and in Bhután altitude 4 000 feet

Botanic Diagnosis — By the *Flora of British India*, this is reduced to a mere variety under *A villosum*. In Mánipur I compared this with *A villosum* carefully side by side and I regard *Thomsoni* as a distinct and well marked species which should be placed in the section with undivided leaves having 5 basal nerves *Leaves* ovate cordate acute entire or 3-angled on the apex but never 5 lobed or even 5 angled a foot or more long, thick coarse glabrous

Structure of the Wood — Greyish white, soft and very brittle A tree 150 feet in height hewn down by me in the Koupra forest Mánipur having a stem 80 feet without branches, was shattered to pieces by the fall Weight 44 lbs per cubic foot

MEDICINE.

Cup

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Leaves

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FODDER.

347

TIMBER

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TIMBER.

350

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TIMBER.

352

ACETUM.

Malt Vinegar

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A. villosum, Wall Fl Br Ind I 695Vern — *Karendera* SIMLA *Kikalnshing* N E KUMAONReferences — *Brandis For Fl 111 Gamble Man Timb 100*

Habitat — A distorted deciduous tree 80 feet in height found in the North West Himálaya from the Jhelum to Nepal between 7 000 and 9 000 feet and in Mánipur (on the eastern frontier of Assam) altitude 6 000 feet

Botanic Diagnosis — Leaves 3 5 lobed cordate 5 nerved lobes ovate or lanceolate serrate or repand thin, shining membranous glabrous or tomentose below (the latter condition being simply the younger or less exposed condition upon the same tree) *Racemes* branched or simple pubescent appearing a little before the leaves *Fruit* puberulent brownish *carpels* $1\frac{1}{2}$ to $2\frac{1}{4}$ inches long diverging *wings* venose margins often crenulate *back* rather curved *cells* angular nervose

A handsome tree with the stem bark grey flowering in February and March the leaves appearing in May and the fruit ripening in June

Fodder — Leaves lopped for fodder

Structure of the Wood — White moderately hard close grained beautifully mottled and shining annual rings distinct Weight 38 lbs per cubic foot Not used

FODDER

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TIMBER

355

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ACETUM

Acetum

VINEGAR Eng VINAIGRE Fr ESSIG Germ ACETO, It

VINAGRE Sp

Vern — *Khall* ARAB *Sirkah* PERS *Sirka* HIND *Kadı* TAM *Shukta* SANS

References — *Spons Encyl 2038 U S Dispens 15th Ed 18 Smith on Foods 230 Balfour's Cycl V under Vinegar Baden Powell's Pb Prod I 312 Pharm Ind 267 Year Book of Pharm 1875 46 1876 35 376 1878 159 160 174 1882 119 The Vinegar Plant Treasury of Botany Smith's Dictionary of Economic Plants &c*

Vinegar is an acid liquid used largely as a food auxiliary and to preserve certain articles of food as a medicine and for industrial purposes It is produced (a) by what is known as acetous fermentation of a mixture of malt and unmalted grain (forming malt vinegar) and (b) by the oxidation of white or red wine (forming the white and red wine vinegar) Chemically vinegar is a dilute solution of acetic acid ($C_2H_4O_2$) with certain organic substances derived from and peculiar to the source from which it is derived The finest artificial table vinegar is prepared by mixing 15 parts of glacial acetic acid (of at least 99 per cent) with 235 parts of water and one part of alcohol (94 per cent) or by adding to 250 parts of diluted acetic (6 per cent) 1 part of alcohol If allowed to stand a few weeks the mixture will develop enough acetic ether to impart to it a fine flavour it may be coloured with caramel but is much nicer and cleaner without it A popular prejudice in favour of malt cider and other similar vinegars should be gradually removed (*Dr D R Squibb*) (*Dr Charles Rice New York*) Instead of being made from malt vinegar it is also largely derived from artificial glucose ($C_6H_{12}O_6$, H_2O) and cane sugar or molasses ($C_{12}H_{22}O_{11}$) the substance thus produced is identical with malt vinegar

PREPARATION OF VINEGAR

THE GERMAN PROCESS.

Malt Vinegar — There are various processes for producing vinegar from malt, the practice chiefly prevailing in England being that known

MALT

VINEGAR

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A 357

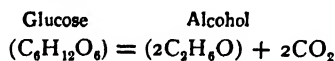
Malt Vinegar

ACETUM.

as the German process The grain (wheat barley oats rice, maize or other grain) is broken and the husk thereby got rid of This is necessary since the phosphoric compounds of the husk retard the process, and the presence of the husk in the vats would add an unnecessary amount of vegetable matter The unmalted grain must be well dried over a kiln previous to crushing in order that many of the glutinous and albuminoid compounds of the grain may be destroyed If this be not done the vinegar will not keep well The crushed grain is now conveyed to the Mash tun and there mixed intimately with water at 77 (170 Fahr) After an hour the wort is conveyed to the boilers and well boiled for the purpose of coagulating the albumen It is then mixed with a certain proportion of malt grain which has the affect of converting the insoluble starch into glucose Malt grain alone cannot be used as it contains much more *diastase* than is necessary for the conversion of its starch into *glucose* The superabundance of *diastase* would produce secondary and putrefactive fermentation It is therefore necessary to mix it with unmalt grain which has previously been roasted on a kiln to destroy its glutinous and albuminoid compounds These compounds compose the protoplasm from which the *diastase* is derived

During the germination of a grain a portion of the protoplasm becomes converted into a chemical substance known as *diastase* This substance has the curious property of converting the insoluble starch contained in the grain into a soluble saccharine compound namely first into *dextrine* and then into artificial *glucose* In the economy of plant life this curious action allows the embryo plant to obtain a soluble food from the seed enabling it thereby to produce and develop a root which soon supplies the further wants of the plant The proportions in which the malt and unmalt grain should be used will depend very much upon the nature of the grain and can be determined by experience or experiment only

The Chemistry of Vinegar—Up to this stage the manufacture of vinegar is almost identical with beer brewing The mass by the chemical action described having been converted into glucose is run into the fermenting vat and yeast added when fermentation at once commences Unlike beer brewing it is now the object of the vinegar maker to convert the whole of the glucose into alcohol This is done by forced and repeated additions of yeast the glucose being converted into alcohol and carbonic acid eliminated —

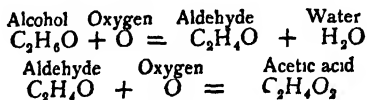


When the entire volume has been converted into an alcoholic liquid it is pumped into vats and allowed to clear itself of dead yeast and cloudiness by subsidence It is then passed through a filter into the acetifier It is the process by which this alcoholic liquid is at this stage converted into acetic acid (or vinegar) that constitutes the difference between the various processes of vinegar brewing In the German process for a period of about six weeks the liquid is being constantly pumped from the bottom of the acetifier or vinegar generator and made to fall down again in a finely divided condition by passing through small openings in a wooden lid placed over the top of the generator thereafter to trickle through a layer of specially prepared or purified beech twigs or charcoal While trickling through these contrivances the alcoholic liquid becomes oxidised and reduced thereby to vinegar This is accomplished by two atoms of hydrogen separating from the alcohol and forming with one atom of oxygen from the air a molecule of water By this separation of hydrogen the alcohol is reduced to the inflammable ethereal liquor known as aldehyd

ACETUM

Malt Vinegar

(or alcohol dehydrogen) By the absorption of an atom of oxygen from the air this compound is next formed into acetic acid —



The whole process of making malt vinegar occupies about two months, after which time it is stored in vats for the purpose of cleansing colouring &c

THE FRENCH PROCESS

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According to **Pasteur** the process of acetification is not spontaneous oxidation caused through the simple exposure of an alcoholic liquid to the complete influence of the oxygen of the air but is due to the oxidising influence of the growth of a mycoderme closely allied to dry rot (see Vinegar Plant) within the vinegar generator. The chemical actions indicated are quite correct but the initial or starting agent in these changes is the growth of the vinegar plant upon the oxidising apparatus. In support of this theory it may be stated that in the absence of light both fermentation and acetification is greatly retarded light being necessary for the growth of the yeast and vinegar plants.

Vinegar may be clarified by throwing about a tumblerful of boiling milk into fifty gallons of the liquid and stirring the mixture. This operation has the effect at the same time of rendering red vinegar pale. At one time it was thought necessary to add free sulphuric acid to vinegar in order to stop further chemical changes and to destroy the mycoderme which might still be surviving within the liquid. The law formerly authorised 1 part of acid in 1000 of vinegar. The necessity for acid is the confession of defective preparation chiefly due to the whole of the glucose not having been changed into alcohol or to too much diastase having been formed in the wort. According to the Food and Drug Adulteration Act the addition of sulphuric acid in however small a proportion constitutes an adulterant. Accordingly **Pasteur** recommended that the mycoderme should be systematically sowed and the alcoholic liquid carefully added until complete acetification be accomplished. The mycoderme exists in two forms (which may be distinct species) both of which have the power of acetification. In the one it consists of extremely small globules (micrococci) arranged and adhering together in contiguous rows (sometimes in addition enveloped in a glue like mass). In the other the mycoderme is made up of rod like forms (bacilli).

This has been called the **FRENCH PROCESS** and it was originally applied practically in 1869 by **Beton Laugier** and more recently perfected by **Mr Emanuel Warm**.

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THE QUICK GERMAN PROCESS

This is chiefly practised on the Continent and consists in taking alcohol and water instead of malt. Alcohol being free of duty (on the Continent) this can be done at a price which admits of competition with the ordinary malt vinegar. The pleasant aromatic odour of the malt vinegar is obtained by mixing a small quantity of the brewed wort with the alcohol and water.

Wine-Vinegar or Acetum Gallicum.—This is made from either white or red wine giving origin to white and red wine vinegar. This is chiefly prepared from wines which have shown a tendency to become sour. It is the sugar present in the wine which acts as the ferment when wine

WINE
VINEGAR.
White
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A 361

| Wine Vinegar | ACETUM. |
|--|--------------------|
| <p>naturally undergoes acetous fermentation In the same way vinegar is made from ciders molasses &c</p> <p>To prepare wine vinegar casks capable of holding 100 gallons are arranged in rows in a shed kept at the temperature of 75 to 85 The casks are open at the top to allow free access of air A small quantity of boiling vinegar is added to each cask and every eight or ten days a few gallons are added until the casks are two thirds full After 10 to 14 days the acetous fermentation is complete A few gallons of vinegar are withdrawn from each and wine added and so the process is carried on Upon the inside of the older casks a crop of the mother of vinegar plant will be found and when once established this greatly accelerates the fermentation</p> | <p>Red 362</p> |
| <p>Wine vinegar is said to always contain a little aldehyde It is nearly one sixth stronger than pure malt vinegar</p> <p>Chemical Tests—Vinegar should have the sp gr of 1.017 to 1.019 If aldehyde be present (sometimes the case in wine vinegar) its presence may be at once detected by Trommer's test for having like glucose the power of absorbing oxygen the red sub-oxide of copper will be precipitated from Fehling's test solution proving the presence of aldehyde The most dangerous impurities are copper lead and even tin derived through carelessness from the apparatus used These metals will at once be detected through the black precipitate thrown down in the vinegar on the addition of sulphuretted hydrogen gas and by no precipitate being formed on being boiled with common salt Vinegar should also be devoid of free sulphuric acid If 10 minims of a 10% solution of chloride of barium be added to one fluid ounce of vinegar and the resulting precipitate (if any) removed by filtration the further addition of the barium solution would give no further precipitation if the amount of sulphuric acid formerly authorised (1 in 1000) were present It must not however be overlooked that this test would not only throw down sulphuric acid (if present) but also any sulphate which might exist in the vinegar The presence or absence in vinegar of free sulphuric acid may be conveniently demonstrated by saturating a piece of white paper or of loaf sugar with the vinegar On evaporating the vinegar the paper or sugar will become charred should the acid be present (For charring tests see <i>Year Book of Pharm</i> 1878 174) Dr A Jorissen (in <i>Fourn de Pharm d Anvers</i> 1881 233) describes a new and interesting mode of detecting mineral acids in vinegar To a mixture of one drop of gurgun oil and 25 drops of glacial acetic acid one drop of vinegar is added and after agitation four to six drops of ordinary acetic acid is added No reaction takes place if the vinegar be free from mineral acids but if these be present a violet colour is produced which does not disappear on the addition of alcohol</p> | <p>363</p> |
| <p>In commerce the strength of vinegar is determined by the number of grains of dry carbonate of soda required to neutralise 1 fluid ounce This is the practice in England but in the U S America carbonate of potash is used The strength of vinegar may be accurately determined by means of a standard solution of bicarbonate of potash one fluid ounce of vinegar becoming saturated with 35 grains of the potash salt After filtration the remaining liquid should now be quite free from acidity if not this would prove the presence in the vinegar of other acid substances the presence of which was disguised by the acetic acid</p> | |
| <p>Vohl (in <i>Ber der deutsch Chem Ges</i> November 1877) has designed a simple contrivance to determine the amount of acetic acid in vinegar consisting of a flask provided with a CaCl₂ tube, closed by a caoutchouc stopper through which passes a glass rod terminating in a platinum hook, and supporting a tube of sodium bicarbonate The</p> | |

ACETUM

Indian Vinegar

apparatus is weighed alone the vinegar added and after weighing the bicarbonate is lowered into the liquid. The resultant CO_2 after being entirely removed by suction is determined by the loss of weight and the acetic acid calculated therefrom. A more rapid mode of arriving at the same conclusion has been published by Dr Jehn (*Ber der deutsch Chem Ges Dec 10th 1877*). This consists in introducing 10 c.c. of the vinegar into a flask containing an excess of sodium bicarbonate from which the liberated CO_2 is conducted into a second jar filled with water. The fall of the level of water displaced by the carbonic acid will indicate the volume of gas liberated and from this the percentage of acetic acid contained in the 10 c.c. of vinegar may be determined. The jar may be so graduated as to indicate at once the percentage composition or the displaced water may be conducted into an accurately graduated cylinder indicating by the volume of water the same result (*Archiv der Pharm May 1877 Year Book of Pharm 1878 160 U S Dispens 15th Ed 20*).

Adulterations—In addition to sulphuric acid copper lead and tin are commonly met with

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Indian Vinegar

§ 6. The acidity of vinegar is due to the presence of acetic acid. An impure variety pyroligneous acid is a product of the destructive distillation of wood. Glacial acetic acid the variety which crystallises below 63 Fahr is obtained by converting the crude acid into a salt and distilling the purified and dried acetate with concentrated sulphuric acid. Acetic acid is also largely obtained by the oxidation of alcohol. An aqueous solution of pure alcohol will not yield acetic acid on exposure to air but when mixed with certain easily changeable organic materials it undergoes the so called acetous fermentation. But this oxidation can also be brought about by inorganic oxidising agents. According to Pasteur the first described variety of fermentative action is due to the presence of a mycoderma the *Mycoderma aceti* which when developed in large quantity is commonly called the mother of vinegar. The acidification of wines thus yields white and red wine vinegar while beer or malt infusions produce the brown malt vinegar of commerce. When solutions of malt or saccharine substances are used for the manufacture of vinegar the sugar is first converted into alcohol by yeast and then on exposing the so formed dilute alcohol to air oxidation of the alcohol occurs with the formation of acetic acid. As a rule vinegar contains about 5 per cent of acetic acid.

In India vinegar is made from toddy the fresh juice of the *Borassus flabelliformis* and *Cocos nucifera*, and also from the inspissated juice, jaggery by dissolving it in water and exposing the solution to air in earthen jars. The dried flowers of the *Bassia latifolia*, *mohwa* infused in water also yield a saccharine liquid which readily undergoes the acetous fermentation and produces an excellent vinegar. Regarding the strength of country vinegars according to Dr Lyons experiments the amount of acetic acid ought to be at least from 4 to 5 per cent in toddy vinegar. Many samples have however been found to contain less than 3 per cent and in one case the acidity was as low as one and a half per cent. (*Surgeon C & H Warden Calcutta*).

The manufacture of vinegar may almost be said to be common to every district in India especially in Mahomedan centres the Hindus use very little except as medicine. The alcoholic liquid is placed in enormous earthen jars half imbedded in the soil and left until the acetification has been accomplished. The article produced is very inferior in quality to European vinegar and is entirely consumed within the country being largely used in the preparation of pickles &c. Mr Baden Powell says

Medicinal uses of Vinegar

ACETUM.

The vinegar obtained from sugar cane juice is generally a poor stuff and does not contain more than 2 per cent acetic acid but at some places it is made well especially at Delhi. A large number of bottles of vinegar sold in the country with the ticket and capsule of Crosse and Blackwell are in reality bottles which once contained the real article but when emptied are refilled with country vinegar and sold a little cheaper under the above name. I have seen however really excellent vinegar from Peshawar which was made from grapes it was quite fit for table use.

There appears to be no export trade in vinegar and the extent of the import trade cannot be determined, since it is included under the heading of Oilman's Stores.

MEDICINAL USES OF VINEGAR

§ In India vinegar is made from rice sugar various fruits &c and is largely used by hakims as a medicinal agent. In the pure state it is escharotic. Applied externally mixed with sweet oil or water it is largely used for congestive headaches and in sunstroke. In catarrh it is used like smelling salts. As a vapour bath it is useful in reducing the high temperature of fevers. It is extensively made use of by hakims for the destruction of ectozoa and entozoa. The vapour of vinegar applied to the ear is beneficial in earache and deafness. In dyspepsia with foul breath the natives use it internally mixed with salt and this same mixture combined with alum is employed as a dentifrice and astringent for bleeding gums. For sore throat it is used as a gargle mixed with hot water. Diluted solutions are given as cooling draughts and to quench thirst. Highly prized by natives for reducing obesity. The vinegar made from grapes mixed with salt is a local application to the bites of mad dogs. It is also a much prized remedy for ringworm. A weak solution is applied to burns and scalds. Combined with sulphur it is said to be beneficial in chronic rheumatism and gout. Mixed with sweet oil it is applied locally over rheumatic and stiff joints. If used for any length of time it is an anaphrodisiac. (*Surgeon G. A. Emerson Calcutta*)

Vinegar (a wine glassful) is recommended by Dr. Grigg* in cases of *post partum* hæmorrhage but its action is so rapid that he refrains from using it or permitting its use before the placenta is expelled for fear of causing a retention of that body and making its removal difficult. (See *British Medical Journal January 12 1884 p 56*) (*Brigade Surgeon W. H. Morgan Cochin*)

I have found it effectual (as recently suggested in *Br Med Journal*) in *post partum* hæmorrhage in dose of a W. F. wine glassful. (*Surgeon Major W. Farquhar M.D. Ootacamund*) A solution of borax in vinegar is much used for ringworm in dispensary practice. (*Asst Surgeon Fawwant Rai Multan*)

Vinegar prepared from toddy obtained from the Palmyra palm fermentation is very effectual in checking troublesome hiccough. A diluted solution of vinegar has been frequently used by me to check the intolerable itching in some forms of herpes and with very good effect. (*Hon Surgeon Easton Alfred Morris Negapatam*)

Mahwa vinegar is particularly useful as a diaphoretic especially when neutralised by carbonate of ammonia a cheap and valuable kind of *Liquor Ammoniacæ Acetatis*. (*A Contributor*) Also used in cases of cholera diluted with water in the form of a drink and for this purpose it is prepared from sugar cane juice by keeping it exposed to the sun.

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* Physician to Queen Charlotte's Hospital

ACHILLEA
millefolium**The Yarrow or Milfoil.**

till fermentation ensues (*Assistant Surgeon Anund Chunder Mukerji Noakhally*) The efficacy of vinegar gargle in sore throat is considerably increased by the addition of a few grains of powdered capsicum (*Brigade Surgeon S M Shircore Moorshedabad*)

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ACHILLEA, Linn Gen Pl II, 419

A genus of pubescent herbs (belonging to the Tribe ANTHEMIDEÆ of the Natural Order COMPOSITÆ) comprising some 50 species distributed throughout the north temperate regions of the globe one species being met with on the Himālaya from Kashmir to Kumaon *Leaves* alternate narrow serrulate or pinnatisect *Flower heads* small corymbose heterogamous and rayed or homogamous and disciform (or rayless) *Ray flowers* few male rarely neuter ligulate short white pinkish or yellow *Disk flowers* hermaphrodite tubulate or compressed and 2 winged base often produced over the top of the achene limb 5 fid *Involucre bracts* few seriate appressed *receptacle* flat or elevated paleaceous *Anther cells* obtuse at the base (not produced into tails) *Pappus* absent *Achenes* oblong or obovoid dorsally compressed glabrous with two cartilaginous wings

The name *Achillea* is given because of its being supposed to be the plant with which Achilles cured the wounds of his soldiers By the ancients the aromatic plant used for this purpose received the name of ἀχίλλειος

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Achillea millefolium, Linn Fl Br Ind III 312

MILFOIL OF YARROW Eng HERBE AUX CHARPENTIER
MILLEFEUILLE Fr SCHAFFGARBF SCHAFFRIPPE Germ
MILLEFOGLIE It YERBA DE SAN JUAN Sp

By the older English writers this plant received the name of NOSE BLEED because the leaves if inserted in the nostrils were supposed to cause bleeding to take place

Vern — *Rojmari* BOMB *Birangasif* CUTCH **Stewart** says this is one of the plants sold in the bazars under the names *Momadru chopandiga* KASHMIR *Bui maderan* AFG

References — *Dymock's Mat Med W Ind* 356 *U S Dispens* 15th Ed 1560 *Bentl & Trim* III 153 *Waring Pharm Jour Ser 2 V* 504; *Proc Amer Pharm Assoc* 1862 113 *Watt's Dict Chem* I 36

Habitat — A native of North Asia Europe and America and of the Western Himālaya from Kashmir to Kumaon altitude 6 000 to 9 000 feet Common on the hills a little to the north of Simla

Botanic Diagnosis — A small herbaceous plant $\frac{1}{2}$ to 1 $\frac{1}{2}$ feet in height glabrous or pubescent with leaves 2 6 inches long *Leaves* oblong lanceolate 3 pinnatisect minutely divided into linear dentate mucronate segments *Flower heads* corymbose ovoid, shortly pedunculate *Achenes* shining

Properties and Uses—

Medicine — The LEAVES and FLOWER HEADS are used medicinally as an aromatic stimulant (see *Artemisia vulgaris*) They are also used as a tonic and in medicated vapour baths for fever

In Scotland at the present day a warm decoction of the fresh leaves is regarded as a family specific against the colds and other ailments common to childhood This plant once held a creditable position amongst British drugs and its recent introduction into the American Pharmacopœia may have the effect of reviving its use in England It might with great advantage be added to our list of Indian indigenous drugs Formerly it was much used in England as a vulnerary and was given internally for the suppression of hæmorrhages and of profuse mucous discharges It

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The Chemistry of Milfoil

ACHIMENES

was employed also in intermittents and as an antispasmodic in flatulent colic and nervous affections Its hot infusion is used as an emmenagogue in France and also in suppression of the lochia it is sometimes employed in low exanthematous fevers with difficult eruption In these cases it probably acts as a stimulant sudorific as do most aromatic herbs In some parts of Sweden it is employed as a substitute for hops in the preparation of beer which it is thought to render more intoxicating (*U S Dispens Ed 15th 1560*) (For this curious property compare remarks under *Absinthe* and *Artemisia Absinthium Linn*)

§ Carminative dose 5 to 30 grains (*Surgeon W Barren Bhuj Cutch*)

Chemical Composition—Von Planta Reichenau found in this species as also in *A moschata* (the *Iva* of Europe) a bitter aromatic bluish green volatile oil *Ivaol* ($2C_{12}H_{20}O$), a substance faintly resembling oil of peppermint and a peculiar nitrogenous principle *Moschatin* ($C_{25}H_{37}NO_7$) (*Ann Chem Pharm CLV 145*) The aromatic property is strongest in the flowers and the astringency in the leaves *Zanon* found in addition to the volatile oil and *moschatin* a third substance which has been called *Achillein* a compound which has been determined to be composed of $C_{30}H_{38}N_2O_{16}$ (*Ann Chem Pharm LVIII 21 and CLV 1870*) a bitter principle soluble in water but with difficulty in absolute alcohol *S de Luca* experimenting with *A Ageratum* has found similar results This plant when rubbed between the hands gives out an aromatic camphorous odour and if distilled in a current of steam furnishes an essential oil the composition of which has been found to be $C_{26}H_{44}O_8$ (*Year Book Pharm 1876 43 1881 156*)

Dr Dymock says that the flowers of *A Santolina*, *Stocks* (? *Linn*) are used in the Bombay Presidency and are known as *branjastif but mad eran* PFRS This plant is apparently imported into Bombay from Persia where it is called *dermeneh* or vulgarly *varek* or *yoshen* It is not a native of Egypt

Domestic Uses—A large number of species and cultivated forms of *Achillea* are met with in gardens in Europe many of them forming highly ornamental foliage clumps for border and bed cultivation They are propagated by root divisions cuttings and seeds

Achilleinum—A spirit, distilled from *Achillea millefolium*, is used by the Italians in intermittent fever

ACHIMENES, *P Br Hist Jam*, 271 *Gen Pl II* 998

A genus of elegant villose herbs (belonging to the Natural Order GESNERACEÆ) They are all favourites of the modern gardener and his art has perhaps done more to multiply the cultivated forms of this than any other genus of similar size They are occasionally met with in our Indian orchid houses but require great care they are natives of tropical America The Natural Order GESNERACEÆ is sub-divided into three great sections or sub-orders The Indian indigenous examples belong to the CYRTANDREÆ (characterised by having exalbuminous seeds contained within a contorted capsule or berry) The ACHIMENES belong to the sub-order characteristic of America, viz GESNERACEÆ recognised by having albuminous seeds contained within a capsular fruit semi inferior or inferior

In *Achimenes* the flowers are large axillary variously coloured *Corolla* tubular straight or curved often obliquely dilated at the mouth *Anthers* in fours connivent or coherent included within the corolla the *filaments* being attached to the base of the tube *Disk* annular entire or 5-lobed *Ovary* inferior cohering to the base of the calyx *style* elongated *stigma* dilated and concave or sometimes distinctly 2 lipped Chiefly

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**ACHRAS
Sapota****The Sapodilla Plum.**

tomentose herbs with spherical rhizomes from which they are readily propagated

By some authors the genus has been broken up into various genera of which perhaps *Tyda* is the most deserving of an independent position. The following may be mentioned as a few of the more important species generally met with in cultivation: *A. coccinea*, especially *var. major*, *A. Escheri*, *A. floribunda elegans*, *A. formosa*, *A. grandiflora*, *A. Jaya*, *A. longiflora*, *A. Mountfordii*, *A. patens*, *A. pedunculata*, &c. They are perennials, the leaves dying annually. When the old rhizomes commence to give off shoots these should be collected and planted six in a pot in a soil composed of equal parts of loam, leaf mould and sand.

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ACHRAS, Linn Gen Pl II 657

A genus comprising only one or two species (belonging to the Natural Order SAPOTACEÆ). By *DeCandolle's Prodrômus* this genus was reduced to *Sapota* but *Bentham* and *Hooker* in their *Genera Plantarum* have restored it. The genus may be briefly defined as having the flowers clustered in the axils of the leaves, 6 merous, with leafy *staminodes* inserted upon the lower part of the corolla, and nearly as large as the petals. *Stamens* 6, *filaments* compressed, subulate, opposite the petals. *Fruit* superior, 8-10 celled, with one large, erect, albuminous seed in each cell.

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Achras Sapota, Linn Fl Br Ind III 534

THE SAPODILLA PLUM of the WEST INDIES, the BULLY TREE, or NEESBERRY

Syn—*MIMUSOPS MANILKARA* Don

Vern—*Sapotá* HIND and BENG *Chikali* BOMB *Shimas eluppai* TAM *Sima ippa* TEL *Kumpole* KANARA *Chakchakóti kashur* DUK *Twotta pat* BURM

The Tamil name should not be confused with the names applied to *MIMUSOPS* and to *BASSIA*.

Habitat.—Introduced from America and now cultivated throughout India. *Roxburgh* speaks of the Chinese specimens not flowering in the Calcutta Botanic Gardens while the West Indian plants growing alongside of them were doing so. It would thus appear that the plant apparently reached India by way of China as well as direct from the West Indies.

An evergreen tree with dome of dark green shining leaves. The fruit is about the size of a hen's egg and much of the same shape, dark brown with a sort of mealy surface. Pulp greenish brown with generally 2 or 3 seeds developed. When ripe and just before it becomes over-ripe the fruit is often very pleasant although little eaten by Europeans in India. Commonly sold in the streets of Calcutta about the beginning of the hot season under the name of *Mangosteen*, a fruit which at first sight it somewhat resembles. The absence of the sessile peltate stigma so characteristic of the apex of the *Mangosteen* fruit will at once remove the delusion and expose the impostor who makes a large profit by selling his fruit under a false name. A fine evergreen tree producing delicious fruit. (*Baron Von Mueller*)

Medicine.—The bark was formerly regarded as a good and useful substitute for *Cinchona*.

Structure of the Wood.—*Kurz* says: Wood uniformly brown, close-grained, rather light, hard, valued in South America for the shingles of corn houses. Wood reddish brown, hard, heavy, and very durable (*Bullet* or Bully wood of Central America and the West Indies). (*Brandis*). 'Wood is dull red, short but straight in the grain and very dense.' (*Bomb Gas XV Part I 61, Kanara*)

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The Chaff flower—Medicine.

ACHYRANTHES
aspera.

ACHYRANTHES, Linn Gen Pl III 35

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A genus of herbs or small shrubs (belonging to the Natural Order AMARANTACEÆ) found in the tropical and sub-tropical regions of the Old World

Leaves opposite, petiolate ovate oblong or lanceolate entire *Flowers* hermaphrodite deflexed and compressed to the rachis arranged in elongated loose terminal simple or paniculate spikes white or coloured *Bracts* 3 the central large in contact with the flower the lateral spreading spiny *Prianth* of 4 to 5 green rigid coriaceous *sepals* sub-equal subulate-lanceolate aristato-acuminate glabrous or pilose *Stamens* 5 rarely 2 or 4 filaments subulate above the base membranous united into a cup *anthers* oblong 2 locular *Ovary* oblong sub-compressed glabrous *style* filiform *stigma* capitate *ovule* one suspended *Seeds* inverted oblong; *testa* thin coriaceous *arillus* absent *albumen* farinaceous *radical* erect.

The name *Achyranthes* is derived from *αχυρον* chaff and *άνθος* a flower or blossom in allusion to the appearance of the flowers There are in all about 12 species in the world

Achyranthes alternifolia, Linn AMARANTACEÆ

Syn for *Digera muricata* Mart which see

A. aquatica, Roxb by Wallich formed into the genus *CENTROSTACHYS* but by *Genera Plantarum* has been again reduced to *ACHYRANTHES*

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A. aspera, Linn

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THE PRICKLY CHAFF FLOWER

Vern.—*Apang* BENG *Apang* ASS *Latjira chichra chirchira chirchitta* HIND *Aghada* BOMB *Mar Apam rga aah ta apangaka* SANS *Uttar ni anti ha apa margamu* TEL *N yurivi* TAM *Kutri Pi kataluti* MAL *Utrani gida, uttar ne* KAN *Agh do* GUJ *Atku mah* ARAB *Khare v shun* PERS *Kiva la mon kune la mon* BURM

References—DC *Prod XIII* II 314 U C *Dutt Sans Mat Med* 221 *Dymock Mat Med W Ind* 538 *Roxb Fl Ind Ed C B C* 226 *Voyt's Hortus Suburb Calc* 318 *Drury's Us Pl II Pharm Ina* 184

Habitat—A shrub 3 4 feet high found all over India ascending to 3 000 feet in altitude A troublesome weed in gardens

Botanic Diagnosis.—Stem erect striated *Leaves* ovate-obtuse acuminate base cuneate petiole short pubescent from a coat of long simple hairs

Properties and Uses—

The Ash as a Mordant.—The ashes of this plant are used as an alkali in dyeing

Medicine.—THE WHOLE PLANT has astringent and diuretic properties assigned to it. Of the former property little is known for certain but it is said to be successfully used in native practice in the treatment of menor rhagia and diarrhoea It is reported to be used by the women of Bengal to produce abortion and holds a high reputation for this purpose but it most probably acts mechanically the prickly flowering spikes being inserted into the uterus A correspondent informs me that if THE JUICE of the plant be injected into the os uterus labour pains will be set up rapidly On the other hand A DECOCTION of the plant is highly spoken of as a laxative and promoter of secretions it is used in combination with other medicines of its class in ascites and anasarca' (U C *Dutt Civil Medical Officer Serampore*) Dr Bidie says 'Various English practitioners agree as to its marked diuretic properties in the form of a decoction Dr Cornish reports favourably having found it efficacious in the treatment of dropsy It possesses valuable medicinal properties as a pungent

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Seeds.
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Spikes.
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Decoction.
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ACHYRANTHES**aspera.****The Prickly Chaff flower**

and laxative and is considered useful in dropsy piles boils eruptions of the skin &c THE SEEDS and LEAVES are considered emetic and are useful in hydrophobia and snake bites (*T N Mukharji's Amsterdam Catalogue*)

As a POWDER the dried plant is given to children for colic and also as an astringent in gonorrhœa (*Stewart's Panjab Plants*)

Major Madden says that the FLOWERING SPIKES are regarded as a protective against scorpions the insects being paralysed through the presence of a twig **Dr Shortt** reports on its use as an external applicant in the treatment of the bites of insects and **Mr Turner** calls attention to it as a remedy in snake bite (*Pharm Indica*)

THE ASH yields a large quantity of potash rendering it useful in the arts as well as in medicine Mixed with orpiment it is used externally in the treatment of ulcers and of warts on the body (*U C Dutt Civil Medical Officer Serampore*) Sesamum oil and the ash (*apamarga taila*) are used in the treatment of disease of the ear being poured into the meatus As an ash however there seems no reason to think it possesses any virtues other than those of the simple alkali of our shops

The seeds are given in cases of hydrophobia and snake bite the juice of the flowering spikes for scorpion bite and the ashes of the plant have been successfully used in dropsy (*Bomb Gaz VI 14*) In Western India the juice is applied to relieve toothache (*Surgeon Major W Dymock Bombay*)

The drug is best administered in the form of a decoction prepared by boiling two ounces of the fresh plant in a pint and a half of water till reduced to one pint then straining Of this the dose is two fluid ounces or more should the diuretic operation be desired

Special Opinions—§ The seeds and also leaves relieve the pain of scorpion bites and allay the irritation of boils and of pleurodynia The juice of the leaves is useful in snake bite The dried leaves are smoked in asthma and they are also used internally in dropsy dose 4 grains (*Surgeon J McConaghey Shahjahanpore*) Is found highly useful in the treatment of general dysentery (*Pharm Ind 184*) (*Surgeon H McCallan M D Bombay*)

No protection against scorpions I have tried the flowery spikes the root and branches but the paralysing effect did not follow the insects ran busily so soon as the pressure of the twig or root &c was removed (*Surgeon B Evers M D Wardha*)

This is found useful as a diuretic in dropsical affections and has been freely used in the hospital here in combination with other diuretics and tonics **Preparations** Take of root with stems and leaves one ounce water ten ounces boil for fifteen minutes in a covered vessel and strain **Dose**—From one and a half to two fluid ounces twice or thrice a day (*Apothecary J G Ashworth Kumbakonam*) The fresh leaves bruised into a paste and mixed with black pepper and garlic are used as an anti periodic in the form of pills It is given before the attack comes on (*Surgeon Major John Lancaster M B Chittore*) Decoction of the entire plant is useful as a diuretic in dropsical affections rubbed into a paste with a little water it forms a favourite application to stings of wasps bees and other insects (*Assistant Surgeon Shri Chunder Bhattacharya Chanda Central Provinces*)

In simple anasarca I have found it of marked benefit (*Surgeon General William Robert Cornish F R C S Madras*) The tender leaves ground into a paste with a little sugarcandy and with the addition of a little butter fried to a proper consistence it is useful in the early stage of dysentery (*Surgeon Major D R Thompson M D C I E Madras*)

The extract is used in cases of dropsy and gonorrhœa mixed with

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Isinglass.

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huso

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the extract of white rats (Surgeon W Barren, Bhuj Cutch) "The seeds are supposed to impair appetite and are given in the form of congee for excessive hunger (Surgeon Major F Robb Ahmedabad)

It is useless in snake-bite (Surgeon V Richards Goalundo Bengal)

I have tried this largely in the shape of a strong decoction in two-ounce doses in dropsy especially of malarial origin and found good results as a diuretic (Assistant Surgeon Debendro Nath Roy Sealdah Calcutta)

If the bark of the root is mixed with an equal quantity (say five grains) of black pepper it may be given in cases of intermittent fever with good results (Surgeon W Wilson Bogra) The fresh juice of the leaves thickened into an extract by exposure to the sun and then mixed with a little opium may be beneficially applied to primary syphilitic sores (Surgeon Major Bankabehari Gupta Puri)

Several Native practitioners use the decoction as a diuretic in gonorrhoea and dropsical affections (Surgeon Major R L Dutt M D Pubna)

Achyranthes ferruginea, Roxb Syn for **Psilotrichum ferrugineum, Endl**

A incana, Roxb Syn for **Ærua javanica, Fuss** which see

A lanata, Linn Syn for **Ærua lanata, Forsk** which see

A lappacea, Linn Syn for **Desmochæta atropurpurea, DC** but by the Genera l'antarum it has been reduced to the genus **Papalia** which see

A nodiflora, Linn Syn for **Allmannia nodiflora, R Br** which see

A prostrata, Linn Syn for **Papalia prostrata, Mart** which see

A scandens, Roxb Syn for **Ærua scandens, Mart** which see

A triandra, Roxb Syn for **Altermanthera sessilis, R Br** which see

ACID

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Acids are chemical compounds of two or more elements of which Hydrogen is generally one. A few compounds are known as acids however which do not contain Hydrogen such as Silicic Acid (SiO_2) and CO popularly known as Carbonic Acid. They may be referred to two great sections—acids which contain oxygen and hydrogen in combination with one or more elements and acids which do not contain oxygen. They generally possess an acid taste turn blue litmus into red and neutralise the basic oxides forming salts. When basic oxides form with water soluble hydroxides these compounds are alkaline in their reactions and antagonistic to acids they transform the acid red of litmus into the alkaline blue. An acid may be defined as a hydrogen compound which has the power of combining with basic oxides to form salts by the partial or complete displacement of its hydrogen. In the commoner salts the basic principle is a metallic oxide. Conversely salts are binary compounds or compounds composed of two principles viz a basic oxide and an acid.

The reader is referred to works on chemistry for an account of the properties and uses of acids a good many of which are now being prepared in India and a large import trade exists in others.

ACIPENSER

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Acipenser huso, Linn PISCES

THE SOURCE OF ISINGLASS

Vern—*Machchhi ka sirish* HIND DUK, *Ghirriyus-samak* ARAB *Sreshame-mahi* PERS *Min-vajjaram* TAM *Chepa-vajra* mī TEL

The name of the fish is *Sek mahr* isinglass is *Serishom*—*Sek mahr* (Dr C Rice New York)

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The Aconites

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A sturgeon inhabiting the Caspian and Black Seas

The swimming bladder or sound is cut up into shreds forming the Isinglass of commerce. This is insoluble in cold water but when boiled it is completely soluble and on cooling forms a beautiful jelly. Fifteen grains of Isinglass are sufficient to form a consistence to one ounce of water.

Medicine—It is demulcent and nutritive. It is also used as a test to distinguish gallic from tannic acid the latter becoming yellow. As a substitute for isinglass see *Gracilaria lichenoides*.

A very extensive trade is done from India in what is known in our Trade and Navigation Returns as Fish Maws and Shark fins. During the year 1883-84 the exports under this head amounted to 1 612 014 cwts valued at ₹11 23 254. How much of this could be said to be isinglass is impossible to ascertain. The imports are chiefly from Arabia and the bulk of the exports are to China. The finer qualities of fish maws doubtless find their way into the isinglass market.

For further information see under Fish Maws.

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§ Indian isinglass which is of very good quality is got from a species of *Polynemus* (see *Royle's pamphlet and Day's Fishes*) (*Deputy Surgeon General G Bidie Madras*). In the last July sales of Mincing Lane 380 packages of East Indian isinglass were offered comprising 192 cases Penang 127 cases Bombay and Kurrachee and 61 cases Saigon. Bombay tongue good to fine fetched from 3s 5d to 3s 11d per lb. The qualities in the market are 1st Leaf 2nd Tongue 3rd Pipe 4th Purse. The 1st is worth 1s to 1s 6d per lb only. A reference to the Mincing Lane Reports will show that the isinglass of commerce is practically all East Indian (at any rate as far as the London market is concerned). The sales are sometimes over 500 packages at one sale. In the Indian Trade Returns isinglass is entered as Fish Maws. It is obtained from various kinds of large fish. The trade names depend upon the shape when dried. Russian and Brazilian isinglass would seem to have found another market. (*Surgeon Major W Dymock Bombay*)

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A genus of perennial herbs (belonging to the Natural Order RANUNCULACEÆ and the Tribe HELLEBOREÆ) comprising about 180 species inhabitants chiefly of the northern temperate zones some seven species being met with on the Himalaya.

Leaves alternate palmi partite rarely entire. *Flowers* irregular racemed blue purple white or yellow. *Sepals* 5 petaloid the helmet or posterior sepal convex or vaulted the others flat the two anterior ones being narrower than the lateral. *Petal* 2 5 the two posterior ones stalked (clawed) limb hooded and formed somewhat in the shape of a hammer concealed within the helmet the three lower (or anterior petals) small or obsolete. *Stamens* many. *Follicles* 3 5 sessile. *Seeds* many with a spongy rugose or wrinkled testa.

The word Aconitum is ἀκόνιτον, the classical Greek name being derived most probably from ἄκων a dart from its having been used to poison darts.

In connection with the subject of the poison used by the Aka hill tribe on the frontier of Assam I had recently some correspondence with Dr Warden Professor of Chemistry Calcutta. The roots which furnish the poison were identified by me as those of a species of Aconitum most probably indigenous to the mountains bordering on Assam. In other words they were not the Nepal Aconite which finds its way over the greater part of India. I had also the pleasure of examining a root said to be used by the Akas as an antidote against aconite poisoning. This proved to be the classical Costus root. In a private correspondence upon this subject with Dr Dymock of Bombay I received a most interesting

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letter drawing my attention to the numerous references to this same property having been attributed to the Costus root (*Saussurea Lappa*) I take the liberty to extract a passage from this correspondence —

Regarding Costus it was regarded by the Greeks Romans and Muhammadans as an antidote to poisons generally. *Dioscorides* says of it *πινομεῖος δὲ ουγγίας βπληθος εχιοδηκτοῖς βοηθεῖ* and again *μεινυραὶ δὲ καὶ μαλαγμασι καὶ ἀντιδοτοῖς* *Celsus* 5 23 *de antidotis* has three receipts in all of which Costus is an ingredient

Mir Muhammad Hossein in the *Mukhsan* says —

يکمقال ان با حمور و استئين ترياق سوم و حاد انبا سوي ظاهر جلد و حبه
رف سم اعني و مغرب و رتيه و اسنال اينها ار سوم قتاله نافع

ie one miskal of it with wine and wormwood is an antidote to poisons and draws them to the surface of the skin. It is useful to counteract the poison of the viper scorpion and tarantula and other deadly poisons. Practically the antidotes for aconite are diffusible stimulants costus is a stimulant and is given as such in cholera by the natives.

The subject of Aconite seemed deserving of a thorough investigation both with the view of establishing a trustworthy supply of uniform quality for medicinal purposes and if possible of checking the indiscriminate way in which the drug is placed within the reach of persons desiring to use it for criminal purposes. Accordingly I recently addressed the Government of India in the Department of Revenue and Agriculture on this subject submitting along with some of the more interesting facts brought to light in connection with the Aka arrow poison a suggestion to form a Commission of Enquiry. I take the liberty to republish a few passages from that communication —

The genus of plants which yields aconite belongs to the poisonous Natural Order *RANUNCULACEÆ*. The members of that genus are exclusively confined as far as India is concerned to the alpine and subalpine regions chiefly occurring on the Himalaya from Nepal westward to Kashmir. There are in all seven Indian species known to botanists with two or three varieties under two of these species. One contains no aconitia *vis* **A heterophyllum**, and is largely eaten as a vegetable or mild tonic. This species is perfectly well known. Of the other species some are poisonous others not and even some of the varieties of one species are poisonous while other varieties are not. The poisonous forms have never been accurately identified and the result is that of a given weight of the root sold in our druggists' shops a certain percentage frequently contains no aconitia whatever indeed an entire consignment may be perfectly inert. This uncertainty renders the use of aconite objectionable, its action not being constant while it is for many diseases such as certain forms of malarial fever and all skin diseases the most valuable drug known. It is very much to be regretted that so valuable a medicine should thus suffer in consequence of ignorance and I would therefore strongly recommend that a Commission of Enquiry be instituted with the object of determining the following points —

1st—The scientific determination of the various species of **Aconitum**.
Dried specimens of each species in flower should for this purpose be collected with their roots attached so that the characters of the roots of each individual species or variety may be determined and clearly described. Were this done it might be possible to recognise the various forms of aconite sold in the bazars

2nd—To chemically determine the average amount of aconitia in each

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The Aconites of Commerce

species and perform a series of experiments in the cultivation of the various species with the object of ascertaining if there is a fixed average percentage or whether different alkaloids or different proportions of alkaloids are characteristic of certain species. In other words ascertain whether the presence or absence of aconitia is a specific peculiarity or a formation which may or may not take place within the tissue of an individual plant.

3rd—To endeavour to ascertain whether the percentage of aconitia can be increased by cultivation and if possible to establish some source from which a constant supply might be obtained. I am not aware whether the Medical Store Department imports its aconite or not but there does not seem the slightest reason why India might not supply the world with this most valuable medicine and supply it in such a manner as to do away with the uncertainty which centres around the use of the drug at the present day. Perhaps it might be that the extermination of inert forms from certain limited tracts of the higher Himalaya would be all that might be necessary allowing thereby the aconitia yielding forms to naturally become more prevalent. All the species are exceedingly plentiful on the alpine Himalaya from Nepal westward to Kashmir one or two species finding their way eastward to Assam through Sikkim and Bhutan.

4th—To ascertain the areas and statistics of production of the different aconite roots at the present time and the chief centres of exportation.

In support of these recommendations I beg to quote one or two of the numerous appeals which have appeared in European medical publications. Dr Cook in the *Year Book of Pharmacy for 1873* page 21 writes as follows. In this instance of an important drug involved in mystery we see the necessity for some official medium through which to prosecute inquiry. Individual effort is insufficient and the only effectual mode should emanate from the Government of India to ascertain the areas and statistics of production of the different aconite roots in the Himalaya—their value commercially on the spot the native names applied to the different kinds and the plants producing them properly and satisfactorily identified. Then as a consequence the different varieties will be analysed and the value of each determined according to the amount of alkaloid present. This is but one out of scores perhaps hundreds of instances in which information is required of a special character on the products of our vast Indian Empire and which no private effort is capable of obtaining. Dr E. R. Squibb also writes in the same volume. Although but few drugs are apparently more cheaply and easily obtained than aconite root yet perhaps in no other is there so great an amount of uncertainty many parcels having been found to be comparatively worthless in a medical point of view.

In the *Admiralty Manual of Scientific Inquiry* (and republished in *Hanbury's Science Papers* 187) occurs the following significant interrogation which strange to say remains unanswered. *Aconite root* has been imported in considerable quantities from India. In what district is it collected and from what species of *Aconitum*? This admission of want of definite information regarding the source of Indian aconite was made in 1871 by Professor Oliver and the late distinguished scholar and pharmacologist Daniel Hanbury and it has still to be answered before we can be said to possess any trustworthy data upon which to base a definite and accurate knowledge of what may be justly called India's most valuable indigenous drug.

The following are the principal Indian species with the information

Indian Aconite.

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ferox

which can be gathered regarding each from works on Indian Economic Science —

Aconitum ferox, Wall *Fl Br Ind*, I, 28

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INDIAN ACONITE

Vern.—*Bish* (bikh) *bis* (derived from the Sanskrit *Visha*) *bachnak mithā-sahar singyā bis singya tel ya bis bachhnag* HIND *Kat bish* or simply *bish* BENG *Bish* ASS *Visha vat anabha* SANS *Bish* ARAB *Bishnag* PERS *Bachnag* MAR *Vachnag* or *vachha nāg* GUJ *Buchn ga* CUTCH *Vasha navi* TAM *Vasanābhi nubhi* TEL *Valsanabhi* MAL *Vasan bhi* KAN *Vachanabhi* CINGH

It is probable that under the above vernacular names the majority of the poisonous forms of aconite are sold by our native druggists. Most authors however agree in regarding these as more properly belonging to this species.

Dr. Moodeen Sheriff regards *Jadur* as the only safe generic name for the species of medicinal aconite. The names *Singyi* or *singyā bis* and *mithā sahar* are applied to two forms of Aconite generally referred to this species (See below).

References—*Pharm Ind* 3 and 434 *Fluck & Hanb Pharmacog Bentl & Trim Med Pl* 5 *O Shaughnessy's Bengal Disp* 165 *Dymock's Mat Med W Ind* 1 *Drury's Us Pl* 12 *Royle's Mat Med Ed by Harley* 776 *Groves in Year Book of Pharm* 1870 1873 p 500 *Moodeen Sheriff Supp Pharm of Ind* 25 32 265 *Cooke in Pharm Jour Ser* 3 Vol III p 563 *Duquesnel De l'Aconitine Crystal Paris ana Pharm Fl Ser* 3 Vol II pp 602 623 and 662 *Alder Wright Year Book of Pharm Report on the Aconites* 1st article in 1875 p 514 and 1876 p 531 3rd 1877 p 444 4th 1878 p 483 5th 1879 p 417 6th 1880 p 455 and 1881 p 140

Habitat.—Temperate sub alpine Himālaya from Sikkim to Garhwāl altitude 10 000 to 14 000 feet

Botanic Diagnosis.—*Stem* erect 3 6 feet high simple below *Leaves* 3 6 inches rounded palmately 5 fid cut into irregularly indented lobes *Inflorescence* a terminal dense flowered raceme with only one or two branches below *bracts* at the base of the peduncle leaf like smaller upwards cut or lobed two small ones usually about half way up the pedicel *Flowers* on long erect stalks thickened above and glandularly pubescent large pale dirty blue *Helmet* about twice as long as high vaulted with a short sharp beak *Follicles* 5 erect usually densely villous and transversely wrinkled *Seeds* having the testa pitted or plated

Differs from *A. Napellus* chiefly in the less divided leaves denser flowered racemes and shorter beak to the helmet

MEDICINAL PROPERTIES

Medicine.—The mass of the root sold in Indian druggists shops as Aconite is derived from this species but several others are no doubt used as substitutes or adulterants. **Dr Bidie** says the root of *Methonica superba* is used as an adulterant in Madras.

Description of the Root.—Fusiform 2 5 inches long and $\frac{1}{2}$ to $1\frac{1}{2}$ broad at the top. As sold in the bazars of India it is often broken through the middle as if from carelessness in digging up shrivelled longitudinally and marked here and there with the scars of small detached rootlets. The colour of the dry root as sold by druggists is blackish brown when broken the fractured surface is compact hard horny somewhat translucent and of various shades of brown. In the rainy season it becomes moist, and when handled stains the fingers brown. This is the *Singyi* or *singyā bis* (horny poison) of the Hindus the *sringi* poison of the Sanskrit authors.

Dr Dymock (as also most other writers) has described another form of Indian aconite attributed to this species *vis.*, with white spongy roots and

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ferox****Indian Aconite****Chemistry**

known in Bombay as 'Lahore *Bachnab*'. This is the *mitha sahar* (sweet poison) of the older writers. It is generally 1 to 1½ inches long tapering compressed rough and wrinkled. Brown externally much paler internally than the preceding. This form is said by some authors to contain more aconitia than the brown horny variety by others it is regarded as decidedly inferior in strength. It is also devoid of the peculiar smell of the former which resembles hyraceum or castor. It seems probable that this smell as also the peculiarity of staining the fingers when moist is due to some mode of drying and rendering the root proof against the attacks of insects rather than a specific property of the root. For this purpose the roots are often dried over a fire boiled in cow's urine or milk preserved in oil &c. A similar practice prevails in Japan where the roots of an aconite are said to be preserved in child's urine.

The specific identity of these two forms appears open to grave doubt however and indeed the chemical nature structural characteristics and the association with Lahore would seem to suggest that the white spongy root was much more likely to be obtained from *A. Lycototum*—a species plentiful on the north west Himalaya from Kumaon to Kashmir—than from *A. ferox*. The latter is the characteristic species of the eastern Himalaya and nowhere occurs west of Garhwal. Being the root of a temperate plant the Lahore *Bachnab* most probably comes from Kashmir and the surrounding mountains (where *A. Lycototum* at altitude 7000 to 10000 feet, and *A. Napellus* at 10000 to 15000 are very plentiful) indeed the latter species is one of the commonest plants on all the higher Himalaya from Kumaon westward but is not met with in the region of *A. ferox*,—the eastern Himalaya.

In European commerce all the Indian forms of aconite are classed as forms of *A. ferox*. This seems an unfortunate mistake the more so since it is by no means the most plentiful and certainly not the most accessible species. It may be quite wrong to limit the dark coloured form to *A. ferox*, but it seems only natural to expect that should the suggestion to form a Commission of Enquiry into Indian aconite be acted upon we shall be able to refer the numerous forms met with in commerce to distinct species. Indeed we shall very likely discover that *A. Napellus* supplies a far larger proportion of our Indian Aconite than we had any idea of before.

CHEMICAL COMPOSITION

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The roots of this species contain relatively to the roots of the other species of aconite a much larger amount of *Pseudo aconitine* ($C_{25}H_{49}NO_{12}$) (or *Nepaline*) a much smaller quantity of *Aconitine* ($C_{33}H_{43}NO_{12}$) and an amorphous alkaloid analogous to but not identical with that found in *A. Napellus*. This alkaloid is non crystalline and yields non-crystalline salts. Wright considers pseudo-aconitine as nearly related to the opium alkaloids narcene narcotine and oxy narcotine which like pseudo-aconitine all give rise to derivatives of dimethyl proto-catechuic acid. Napelline (or *Nepaline* or pseudo-aconitine) was discovered originally by Hübschmann in 1857. It is a white powder, in the form of transparent needle-crystals with a bitter burning taste having a strong alkaline reaction forming with difficulty crystallizable salts. It is readily soluble in water alcohol or chloroform but insoluble in ether. According to Prof Flückiger the most characteristic features of pseudo aconitine separating it from Aconitine proper is the absence of bitterness and its ready solubility in water. The physiological properties of this alkaloid have been carefully investigated by Boshm and Ewers who state that it exerts an influence similar to that of aconitine except that it is more powerful. It has entered largely into the composition of English commercial acon

Its Medicinal Properties

ACONITUM
ferox

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itine (aconitia) owing to the Nepal aconite being so largely used in the preparation of that alkaloid (Conf with chemistry of the compounds derived from **A Napellus**)

Until the suggestion contained above regarding the black horny, and white spongy roots has been proved correct by original investigation of the living plants it would perhaps be unwise and prove confusing to depart too far from the universally accepted notion that they are both forms of **A ferox** **Dr Royle** in his *Materia Medica* (Ed **J Harley**) says '**Dr Headland** found in several experiments the results of which were uniform that while from 54 to 56 grains of aconitia could be obtained from one pound of the horny root 88 to 96 grains were extracted from a pound of the friable root

MEDICINAL USES

The root is commonly regarded as much more powerful than that obtained from **A Napellus**. On this account it is chiefly recommended in the manufacture of preparations to be used externally. Experimenting with the poisonous properties of the aconites **Ewers** discovered that the root of **A ferox** is much more virulent than **A Napellus**. By the natives of India the *bish* (as sold in the bazars) is used extensively both externally and internally but owing to the want of definite knowledge regarding the species which afford this drug much of what has been written by the older authors or indeed can at present be written regarding it, may have to be rearranged and placed under other species.

It is a very effective medicine in various diseases acting as a narcotic sedative, regarded as heating and stimulant useful in fever cephalalgia affections of the throat dyspepsia and rheumatism. *Bish* appears to have been known to the Hindu doctors from the earliest ages. It is much used as an external application the root being formed into a paste (*lep*) and spread upon the skin in neuralgia boils &c. Internally it is chiefly used in the treatment of chronic intermittent fevers (*Dymock*). Europeans use it as a substitute for true aconite. In a recent correspondence between the leading members of the Indian Medical Department and the Government of India several Provincial Committees and distinguished officers recommended that this root should be substituted for **A Napellus** in the official preparations. The Bombay Committee recommended that this should be done chiefly with external remedies adding that it must not be used for internal administration in the same doses the alkaloid *Nepaline* being much more powerful than the aconitine of **A Napellus**. Its therapeutic uses are also defined externally to relieve neuralgia rheumatism gout &c internally to control the action of the heart when increased by disease and to relieve pain in rheumatism. In native practice *Bachanaga* is used in combination with cinnabar sulphur borax, and aromatics in extremely small almost homœopathic doses in intermittent fevers and common coughs with considerable success. (*Brigade Surgeon H V Carter President and Surgeon Major W Dymock and Assistant Surgeon Sakharum Arjun Members of Committee Bombay 20th May 1879*) Before however the bazar aconite is substituted for the aconite of European commerce it seems highly desirable that the identity of the Indian forms be thoroughly established and if possible some arrangement made by which a full and uniform supply of the best Indian article may be ensured.

Special Opinions—§ The root is very useful in the form of liniment in cases of neuralgia and muscular rheumatism (*Surgeon S H Browne M D Hoshangabad Central Provinces*) Tonic and antiperiodic (dose ½ to ½ grain) Used by hakims in the form of pills called *anand*

**ACONITUM
ferox.****Indian Aconite.**

chairawa which are made up of sulphide of mercury *buchnāga tankana khar pimplee* and mucilage (gum) (Surgeon W Barren Bhuj Cutch)

I have tried it and found it utterly useless in cobra poisoning. Indeed without having any influence whatever upon the lethal effects of cobra poison in fact it certainly very much increased the severity of one of the most marked symptoms of cobra poisoning *vis* salivation. It would appear to be an aphrodisiac of some power. I believe it to be a very poor substitute for true aconite (Surgeon V Richards Goalundo Bengal)

An oil is extracted from the root and used for rheumatism as an external application (Surgeon Major J Robb Ahmedabad)

Used by natives in fevers attended with constipation it enters in the composition of purgative pills containing cinnabar and Indian calomel otherwise called *Rasacurpooram* (Surgeon Major J F Fitzpatrick M D Coimbatore)

The fresh root is given in small quantities internally in gonorrhœa (Surgeon Major D R Thompson M D C I E Madras)

Found growing wild in Kalahandi on hilly places used by the Khonds to poison their arrows (Assistant Surgeon Shub Chunder Bhattacharya Chanda Central Provinces)

Aconitum ferox — There are several varieties of aconite root met with in Southern India the most common of which are those which according to their colour or taste are known as the *white* or *sufed buchnāg* the *reddish brown* or *lal buchnāg* the *black* or *kala buchnāg* and the *sweet* or *mītha zahar*. The white and reddish brown varieties can be used internally. They are very useful as sedative nervine and alterative tonics in medicinal doses but a virulent poison in large ones. A few years ago I took the white variety myself in small quantities and found that its internal use is not attended with more danger than that of the European drug (**A. Napellus**). Since that period I have employed it very extensively in my practice and do not hesitate in saying that it is one of the most useful medicines in India. Its beneficial influence over diabetes is very remarkable the immoderate flow of urine beginning to diminish from the very day of its use with a proportionate decrease in the saccharine matter. Its control over spermatorrhœa and incontinence of urine is equally great. It has lately been found useful in some cases of paralysis and leprosy. The advantages of this drug over all other varieties of the Indian Aconite root are that it is not only much milder but also more certain and uniform in its actions. The white and hard variety which I am speaking of is quite different from the white and spongy variety mentioned in some books. I have also used the reddish brown variety pretty extensively and with almost the same results. The above roots are best used in the form of powder with some inert or farinaceous substance as follows. Take of the white or the red variety of the aconite root in powder one ounce arrowroot or wheat flour seven ounces. Mix them thoroughly pass the powder through a fine sieve and rub it lightly in a mortar and keep it in a bottle. The roots can also be employed in the form of tincture but the powder I have just described was so convenient and cheap and proved so successful that I did not think it necessary to resort to any other form. The dose of the powder is from two to six grains gradually increased three times in the twenty four hours the average and usual dose being four grains (Honorary Surgeon Moodeen Sheriff Khan Bahadur Madras)

Said by hakims to be useful in large doses along with stimulants in cases of snake bite and scorpion stings it is aphrodisiac. Very useful for reducing the temperature in fevers (Surgeon G A Emerson Calcutta)

Antiperiodic alterative and expectorant used as a nervine tonic in cases of paralysis. Used as an external application to chronic sores

Atis Aconite

ACONITUM
heterophyllum

Natives prepare it by boiling the root in milk for half an hour repeating this process seven times and afterwards pulverise. This process is said to reduce the poisonous effects of the drug. Dose $\frac{1}{16}$ to $\frac{1}{8}$ of a grain (Surgeon F McConaghey Shahjahanpur). A very useful anodyne liniment is prepared by heating an ounce of coarsely powdered aconite root in half a seer of linseed oil (Assistant Surgeon Mokund Lal Agra). Said to be used in bronchitis and asthma no personal experience (Surgeon F Parker Poona).

While serving at Buxa Bhután a woman attempted to poison her husband by means of the root given in a curry. The symptoms were well marked but he recovered (Surgeon L Cameron Nuddea). A tincture of this drug acts like the true aconite hence it is admissible in inflammations and fevers like the European drug (Surgeon Major R L Dutt M D Pubna). Useful not only in chronic but in acute intermittent fever during the hot stage also in continued fever as well as in all neuralgic affections (Brigade Surgeon S M Shircor Moorshedabad).

Aconitum heterophyllum, Wall Fl Br Ind I 29

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Syn.—A. cordatum Royle A. atels Royle

Vern.—At. atvika HIND BOMB. Ataicha atvishd SANS. Vasse turk. PERS. Ati radayam TAM. Ati vasa TEL. Mohand. guj. saf d hong. saf t KASHMIR. Ais BHOT. (Dr Astichison). Sukhihari chitija i patr. r patis baka PH. Atarishni kali atvish or atvakh GUJ. Atari h MAK. (Assistant Surgeon Sakharan Arjun Ratat Bombay). Ativista Cutch.

Moodeen Sheriff cautions the use of the term *at visha* (*ati* great and *visha* a poison) as applied to this plant and thinks that it should be restricted to the poisonous forms. The Telugu name *Ati-vasa* (*Ati* great and *vasa* the wet flag) is given in allusion to its sipped resemblance to the rhizomes of *Acorus Calamus*. The Arabic word *Jadvár* is the only safe one in ordering the non-poisonous forms of aconite much safer than the Hindustani *Nirbi* (*Nir* free from *bi* poison) because of the latter having been applied by modern usage to many other things (conf. *Curcuma*).

References.—Royle's Ill. 51 t 13. Benl. & Trim. Med. Pl. 7. Klück and Haub. I. pharmac. 14. I. harm. of Ind. 4. O. Shaughnessy's Beng. Disp. 167. Dymock's Mat. Med. W. Ind. 4. Alder Wright in Year Book Pharm. 1879 422. Agri Hort. Soc. of Ind. (1857) XVI. Sec. 1 p. 311.

This is apparently *Caltha Nirbisa*, Ham. and *Nirbisia Hamiltoni* Don. It is most probably the species of Aconite to which the vernacular *Nirbisia* belongs. Hamilton says it is in Nepal called *Nirbishi* or *Nirbochi* (See the concluding para. upon adulteration).

Habitat.—West temperate Himalaya from Kumaon to Hasora altitude 8000 to 15000 feet very plentiful in the neighbourhood of Simla very common on the Sach Pass Chumba along with *A. Napellus*. Altitude 7000 to 15000 feet.

Botanic Diagnosis.—Stem erect leafy 1-3 feet simple or branched from the base glabrous below puberulous above. Leaves 2-4 inches broad ovate or orbicular cordate more or less 5 lobed and toothed (inciso-crenate), acute or obtuse upper shortly stalked or sessile not lobed, amplexicaul, thick bright green pale beneath lower long petioled. Raceme often panicled many flowered. Flowers on long rufous-pubescent peduncles more than an inch long bright blue or yellow greenish with purple veins. *helmet* shortly beaked half as high as long. *Follicles* 5, downy. *Seeds* angled but with a smooth testa. In form of leaf it varies considerably hence the specific name *heterophyllum*.

Description of the Root.—Ovoid-conical tapering to a point from $\frac{1}{2}$ to 1 $\frac{1}{2}$ inch long and $\frac{1}{4}$ to $\frac{1}{2}$ or more thick. Externally light ash coloured wrinkled and marked with the scars of the fallen rootlets with a rosette of scaly

**ACONITUM
heterophyllum****Medicinal uses of Atis Aconite.**

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rudimentary leaves on the top. A transverse section shows the root to consist of a pure white friable amylaceous substance marked towards the centre by from 4 to 7 concentrically arranged yellow dots corresponding to the ends of the fibro-vascular bundles which traverse the root longitudinally. In taste the root is simply bitter with no acidity. It has no odour and may be distinguished from other roots by its bitterness and absence of tingling sensation when a small portion is eaten.

CHEMICAL COMPOSITION

The composition of this root has not by any means been thoroughly established but it may be stated that Broughton first succeeded in separating what appears to be its active principle *vis* the amorphous alkaloid to which he gave the name *Atisine* and assigned the formula $C_{46}H_{47}N_2O_5$. The exact composition of this alkaloid cannot however be said to have been determined as yet and in the *Year Book of Pharmacy for 1879* Wright suggests a correction upon Broughton's formula as likely to be soon established. He percolated a powdered dry root with alcohol containing a little tartaric acid and evaporating the percolate he obtained ultimately Broughton's alkaloid atisine. This was uncrystallizable but with hydrochloric acid and gold chloride he obtained a crystalline hydrochloride $C_{22}H_{31}NO_2 \cdot HCl \cdot AuCl_3$ from which he suggests that $C_{27}H_{31}NO_2$ may prove nearer the correct formula for atisine than that given by Broughton.

Aconitine has not been found in the *atis* root or only in very minute quantities and atisine is not poisonous. It tastes intensely bitter without the slightest tendency to produce the tingling characteristic of the aconite alkaloids. Wasowicz states that it contains the following: (1) a fat probably a mixture of oleic palmitic and stearic glycerides (2) aconitic acid (3) an acid related to tannic acid (4) cane sugar (5) vegetable mucilage (6) pectous substances (7) atisine and (8) starch. It contains 1.87 of 1 per cent atisine.

MEDICINAL USES

The root is pleasantly bitter and is regarded as a valuable mild antiperiodic, aphrodisiac and tonic checking diarrhoea. It may be administered internally with safety owing to the absence of Aconitia or other poisonous properties. It is specially useful in convalescence after fever. As a tonic the dose is 5 to 10 grains three times daily and as an antiperiodic from 20 to 30 grains of the powdered root every three or four hours.

Special Opinions —§ The white or common variety of the root of **A heterophyllum** is a very useful antiperiodic and antipyretic but to ensure its best effects it is required to be administered in its full medicinal doses which are according to my own experience from one to two drachms. It is quite safe up to two drachms and a half. In smaller doses (twenty to forty grains) it is a good tonic but its action as an antiperiodic is very feeble. (*Horovary Surgeon Moodeen Sheriff Khan Bahadur Madras*)

This drug has never produced any substantial benefit in my hands. I am satisfied it possesses no curative value. I have abandoned the use of it. Any benefit derived while it was used might with equal accuracy be set down to *time* and the *vis medicatrix naturæ* of which I had ample evidence in my practice. (*Brigade Surgeon W R Rice M D Fubbul pore*)

I have found *atis* an uncertain antiperiodic although acting well in some cases, especially in mild agues. It requires to be administered in large doses, frequently repeated during the intervals of the fever. (*Surgeon S H Browne M D Hoshangabad Central Provinces*)

A. 404

MEDICINE
Grey Roots
403
White Roots
404

Medicinal uses of *Atis Aconite*.ACONITUM
heterophyllum.

MEDICINE.

‘ Formerly was largely used in Hyderabad (Deccan) as an antiperiodic in mild fevers (*Deputy Surgeon General G Baidie C I E Madras*)

I used this in Government out door dispensaries in large doses (20 to 40 grains) as an antiperiodic in simple intermittent fever but cannot speak very favourably of it (*Assistant Surgeon Debendra Nath Roy Sealdah Calcutta*)

Valuable antiperiodic formerly largely used in out door dispensary in intermittent fevers Dose of powdered root half a drachm (*Assistant Surgeon Shib Chunder Bhattacharya Chanda Central Provinces*) Anti periodic and tonic dose 1 to 5 grains of the powder (*Surgeon W Barren Bhuj Cutch*) I have largely used it in ten grain doses as an antiperiodic in intermittent fevers and as a febrifuge in five grain doses in slight cases of fevers with benefit but I could not depend on it in cases of remittent fever (*Assistant Surgeon Bollye Chand Sen Teacher of Medicine*) White *itis* if from $\frac{1}{4}$ to 2 grains of ipecacuanha is added to each dose is useful as a febrifuge (*Surgeon Major John North Bangalore*) *Atis* powder used as an antiperiodic It does not cause sickness (*Surgeon F French Mullen M D Saadpur*)

Used in chronic diarrhoea and dysentery with other astringents (*Surgeon Major F F L Ratton M D Salim*) Given internally it is said to be useful in boils (*Surgeon G A Emerson Calcutta*) Is a fairly good febrifuge can be obtained in the bazars and may be used when other bitter drugs are not available (*Assistant Surgeon Nehal Singh Saharanpur*) This is a good febrifuge and obtainable in the bazars of Umballa Panjab (*Brigade Surgeon R Bateson Umballa*)

Appears to be efficacious in mild intermittent fever but less so than the cinchona alkaloids (*Assistant Surgeon Jaswant Rai Mooltan*)

Febrifuge and tonic used as a substitute for quinine Dose of the powder 10 grs with 3 grs of *Heera kus* (Ferri sulph) (*Surgeon C M Russell Sarun*) An indifferent antiperiodic used in dispensary practice on account of its cheapness very much inferior to cinchona preparations (*Surgeon G Price Shahabad*) In mild fever 5 to 10 grain doses of the powdered root have been found antiperiodic In convalescence it may be given with advantage in combination with iron ginger &c The infusion of root has been tried but not found so efficacious as the powder (*Surgeon E S Brander Rungpur*) I tried this medicine extensively in the epidemic fever of Burdwan and elsewhere It certainly possesses antiperiodic virtues in larger doses 30 to 40 grains It can only be used in mild intermittent fevers when cinchona alkaloids or arsenic are not procurable (*Surgeon Major R L Dutt M D Pubna*) Very efficacious in the acute stage of dysentery with febrile symptoms Good for ordinary malarious fever in doses of 10 grains given every three hours during the remission (*Dr Forsyth Civil Medical Officer Dinajpore*) *Atis* in doses of gr xxx three times a day is a useful antiperiodic in intermittent and other periodic fevers It is also a valuable tonic in cases of debility (*Brigade Surgeon F H Thornton B A M B Monghyr*)

The numerous opinions received regarding this drug are fairly represented by those published above The remainder are so uniformly to the same purpose if not exactly in the same words that it has not been considered necessary to publish more than the selection given

Adulteration and Substitution.—The root is said by O'Shaughnessy to be adulterated with that of *Asparagus sarmentosus* (*satamul*) Two kinds of the root are met with in the market—(a) grey, shrivelled tubers larger and longer than (b) white the daughter off shoots broken from the former The latter fetch the best price They are slightly scarred from the abrasion of rootlets are generally 2 inches long with a thin tap-like extremity often bifurcated They should break with a short starchy

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406

Adulterants.
407

ACONITUM
Lycotconum

Japanese Aconite

408

fracture presenting a white surface (*Dymock*) The *atis* is eaten fresh by the hillmen of Kanáwar as a mild tonic

Dr Buchanan who first made known the various forms of Aconite referred them to the genus *Caltha* but Don early corrected this mistake by forming them into a new genus to which he gave the unhappy name *Nirbisia* (the antidote) in honour of the vernacular name *Nirbisi* applied to one of Dr Buchanan's plants Wallich subsequently referred these plants to their correct genus *Aconitum* Much confusion still exists as to the true *Nirbisi* for it is by no means clear that it is a pure synonym for *Jadvar* the generic name for the non poisonous forms of the Aconite root The following plants have been also mentioned as bearing the vernacular name *Nirbisi* *Curcuma aromatica* Salisb *C Zedoaria* Roxb which Colebrooke regarded as the Zedoary of the ancients from its synonyms being *Jaduar* and *Zadwar* Dr Royle states that the roots of *Delphinium denudatum*, Wall (*D puciflorum*, Royle) bear the name *Nirbisi* In Dr Dymock's *Glossary of the Bombay Plants and Drugs* *Nirbisee* is given as the Decan name for *Cissampelos* Pareira Dr Dymock has however drawn my attention to the fact that Prof Rudolph Roth the distinguished Sanskrit scholar has identified the roots of *Kyllingia monocephala*, Linn as the *Nirvisha* of the Sanskrit writers This agrees with Roxburgh's remark under *Kyllingia*, where he gives the Bengali of this plant as *Swetagothubi* remarking that *Nirbisee* its fragrant aromatic root is accounted an antidote to poison Dr Moodeen Sheriff Khan Bahadur distinguishes between the words *Nirbisi* (a synonym for *Jadvar*) and the Sanskrit expression *Nirvisham* or *Nirvisha* which expression he says means antidote He concludes his remarks by urging that great care should be shown in prescribing the forms of Aconite under their vernacular names and he regards *Jadvar* as the only name which can with safety be used for the non poisonous forms

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Dr Aitchison in a note published under *A palmatum* says that the word *Nirbisi* is in the Panjab applied to a poisonous form of aconite root By most authors it is applied to *A heterophyllum* only by others (as it would appear with more correctness) to the non poisonous forms of aconite (*A heterophyllum* is known as *atis*) the non poisonous forms being regarded as antidotes to poisons generally hence the name *Nirbisi* It seems probable however that this name has become associated with many antidotes and may indeed have originally been applied to a quite distinct plant such as the roots of *Kyllingia*. (Conf with non poisonous forms of *A Napellus*)

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Aconitum luridum, H f & T Fl Br Ind, I, 28

Habitat —Sikkim altitude 14 000 feet

Botanic Diagnosis —Stem erect simple Leaves palmately 5 fid below the middle segments cuneate ovate 3 fid coarsely crenate Racemes $\frac{1}{2}$ to 1 foot simple pedicels short Flowers dull red helmet with a long straight beak and broad dome like dorsal prominence Seed with a smooth testa No information regarding the economic uses of this species

411

A. Lycotconum, Linn Fl Br Ind, I, 28

Habitat —The temperate Western Himalaya from Kashmír to Ku maon altitude 7 000 to 10 000 feet **Distrib** —Europe and North Asia

Botanic Diagnosis —Stem erect much branched 3 6 feet glabrous or pubescent Leaves 6 to 10 inches diameter palmately and deeply 5 9 lobed lobes cuneate ovate sharply cut lower on long peduncles upper sessile Racemes long branched, tomentose bracts minute Flowers pale yellow or dull purple variable in size helmet with a short beak and long

A 411

Monks hood Aconite

ACONITUM
Napellus.

cylindrical or conical dorsal prominence *Follicles* 3 spreading *Seeds* with plaited testa

No definite information exists in India regarding the economic uses of this species but it has been suggested under *A. ferox* that this may afford part of the Indian aconite

Medicine—By most botanists in Europe this is regarded as the species to which the various forms of Japanese aconite (*A. japonicum* Thunb.) are most nearly related. It was first chemically analysed by Hübschmann who is said to have extracted two alkaloids. These he named *Acolyctine* a white powder insoluble in ether but soluble in water and alcohol *Lycotinine* a crystallizable substance very soluble in alcohol but only slightly so in water and ether. He subsequently came to regard *acolyctine* as identical with *napelline*. Prof Flückiger regards this alkaloid as quite distinct from *aconitine* and *pseudo-aconitine* and much less poisonous than either. Dragendorff has shown that Hübschmann's two alkaloids are but decomposition products of the true alkaloids present in the root of this species. He gave the name *Lyciconitine* to the alkaloid soluble in ether; it differs from every other known alkaloid being richer in nitrogen. The alkaloid extracted by chloroform Dragendorff called *Mycotinine* it is quite distinct from *acolyctine* (*Pharm Journ* 1884 104).

At the same time Wright considers that he has discovered a new base from Japanese aconite which he has called *Japaconitine* ($C_{66}H_{88}N_4O_{21}$) which is said to be even more poisonous than the aconite alkaloids.

It is probable that this species and also *D. paniculatum* (both frequent upon the Alps) yield much of the aconite of European commerce.

MEDICINE
Japanese
Aconite
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Aconitum Napellus, Linn Fl Br Ind I 28

413

This is the true MONKS HOOD or WOLVES BANF ACONITE

Vern—Dudhabinsh k th sh mitha sahar tilia cachang mohri KASHMIR and PANJAB HIMALAYAN NAMES (§ The root of this plant is in Kashmir called *Ban bal nag* (Surgeon Major J. E. T. Arctchison Simla) *Vasa nabhi* (Surgeon Major E. Levinge Rajmundry) TEL *Dudhio va hharad* (Assistant Surgeon Sakharam Arjun kavat) GUJ

References—*Pharm Ind* 1 Fluck and Hanb *Pharm* 8 Bentl & Trm *Med Pl* 6 U S Dispens Ed 15th 126 Bentley in *Pharm Jour* XV 18 Ser 449 Royle *Mat Med* Ed Harley 773 Groves *Year Book of Pharm* 1873 500 1874 507 Wright's Reports on his experiments with Aconite *Year Book of Pharm* 1875 514 1876 531 1877 444 1878 483 1879 417 1880 455 1881 24 1882 223

Habitat.—Temperate alpine Himalaya from 10 000 to 15 000 feet (Sach Pass Chumba Watt) ascending in stunted alpine forms to the highest limit of vegetation in the North West Provinces **Distrib**.—Temperate and Arctic Europe Asia and America

Botanic Diagnosis.—A herbaceous perennial with short fleshy roots. *Stem* erect simple 2-4 feet high smooth green slightly hairy above. *Leaves* variable in size on long petioles spreading deeply palmately cut into 5 or 3 segments segments linear deeply and irregularly multifid, dark green above pale beneath. *Racemes* simple few or many flowered some times with one or two smaller racemes at the base. *Bracts* entire or 3 fid. *Flowers* large ($\frac{1}{2}$ to 1 inch) stalked erect pedicels downy thickened at the end with two small bracts on the apex close to each flower bright blue or dull greenish blue. *Helmet* shallow 3 times as long as high tapering to a slender beak. *Follicles* 3-5 generally hairy. *Seeds* with a smooth testa.

The *Flora of British India* refers the forms of this species to four varieties as follows—

Var 1, Napellus proper *Stem* 2-3 feet leafy *raceme* dense flowered *A poisonous form*

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A 414

ACONITUM
Napellus.**Monks-hood Aconite**

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Var 2, rigidum Stem 2 3 feet few leaved leaves firm sub-coriaceous with spreading falcate sharp teeth racemes lax few flowered tomentose *A poisonous form*

Syn—*A. DISSECTUM* Don *Prod Nepal* 197 *Royle Ill* 54 *A FRROX* Wall *Plant As Rar* t 41

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Var 3, multifidum Stem 6 12 inch erect or decumbent, few leaved leaves 1 to 2 inches in diameter many lobed to the base lobes cut into linear segments racemes lax few or many flowered *Eaten by Bhotias*

Syn—*A MULTIFIDUM* Royle *Ill* 56 *A OLIGANTHEMUM* Kern

417

Var 4, rotundifolium Like var 3 but leaves not divided to the base *Eaten by the Bhotias*

Syn—*A ROTUNDIFOLIUM* Kar *A TIANSHANICUM* Osk & Rupr

The above sub division into poisonous and non poisonous varieties has been republished here in the hope that persons who may have the opportunity of examining the forms of this plant may be able to confirm the curious fact that some of the varieties of a species are poisonous while others are wholesome I strongly suspect that the *Bikhma* of Nepal referred by most authors to *A palmatum*, may prove one of the edible forms of this species and that it may be found to be the same as the *Nirbisi* or *Jadvár* of other authors **Dr Buchanan** in his account of the Kingdom of Nepal includes *Bikhma* as one of the four forms of aconite met with by him **Dr Dymock** says it reaches Bombay from the North and that its value is $\text{Rs } 2$ 6 per lb that it is a valuable tonic of bitter quality but resembling the *atis* root in its chemical properties and therapeutical actions See also *A palmatum* and *A heterophyllum*

Properties and Uses—

Bikhma

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Nirbisi

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MEDICINE

Root.

420

Description of the European Medicinal Root—Usually from 2 to 4 inches long and $\frac{1}{2}$ to 1 inch thick at the top tapering shrivelled longitudinally and beset with the prominent scars of fallen rootlets externally blackish brown internally composed of a whitish farinaceous substance It breaks with a short fracture is sometimes hollow in the centre The transverse section of a sound root shows a pure white central pith many sided with a fibro-vascular bundle at each of its angles The fibro-vascular tissue is devoid of true ligneous cells its tissue being chiefly composed of uniform parenchyma loaded with starch granules A minute portion chewed causes prolonged tingling and numbness of the lips and tongue It tastes at first sweet but soon becomes alarmingly acid

In the fresh state the root has the odour of the radish a peculiarity which disappears on drying It has been mistaken for horse-radish and is said to have caused the death of many persons who have eaten it by mistake for that root This accident could only occur in winter when the leaves have faded and the roots been dug up leafless But even then there should be no mistake The root stock of the horse radish is much larger than the Monks hood it does not taper like the latter plant is pale yellow coloured and the crown marked by transverse scars indicating the positions of the old leaves The aconite has not the sharp pungency of the horse-radish and the scrapings will be observed to turn rapidly red while the tingling sensation of the lips on biting the root should prevent fatal accidents.

It has been found by experiment that the proper season to dig up the root for medicinal purposes is in autumn when the plant is leafless The two new roots occur on either side of the old one The tincture and principal medicinal preparations used in European practice are prepared from the root

Monks hood Aconite

ACONITUM
Napellus.

Leaves and Herb—In European practice the fresh leaves and indeed the whole herb are also used as medicine. The inspissated juice forms the *Extract of Aconite* of our European druggists. This preparation which is somewhat uncertain in its action is sometimes prescribed to relieve the pains in rheumatism inflammatory and febrile affections neuralgia and heart disease. Aconite herb was introduced into the London Pharmacopœia in 1788.

Chemical Composition—Under *A. ferox* and *A. heterophyllum* a good deal has been already said regarding the results of recent chemical analyses of the various aconites. It may be stated that we are on the eve of dispensing with the aconite drugs now in use which owing to the uncertainty of the root used in their preparation could never be depended upon. The chemical constituents of the more important aconites have recently been finally determined and their active principles or alkaloids extracted in a definite and crystalline form. The official aconite preparations of the future may be expected to contain a chemically fixed amount of the alkaloid and their reactions will thus be perfectly trustworthy. For this invaluable result we are mainly indebted in the first instance to *Groves* and *Duquesnel* perfected by *Alder-Wright* and his collaborators.

Formerly by means of rectified spirit water ammonia ether and sulphuric acid an amorphous powder was extracted from the roots of *A. Napellus* known as *Aconitia*. But as the result of the researches of the distinguished chemists whose names are associated with this subject it has been shown that the substance extracted from *A. Napellus* consists of two distinct compounds *vis Aconitine* (proper)—a crystallizable alkaloid—and two non-crystalline bases of which *Picraconitine* may be mentioned.

Aconitine or Aconitia, $C_{38}H_{43}NO_{12}$ —This compound crystallizes in an anhydrous condition melts at $183^{\circ}C$. It is dehydrated by heating with acids more particularly with tartaric acid forming *Apo aconitine* $C_{38}H_{41}NO_{11}$. On saponification with alkali it splits up into benzoic acid and the base *Aconine* $C_{26}H_{39}NO_{11}$.

One of the most important features of the chemistry of aconite is that unless the amount of aconitine present in the root be relatively to the picraconitine very considerable it is impossible to obtain the crystalline form of aconitine. Even when it is possible to produce the crystallization a certain amount of aconitine is always held in solution through the agency of the amorphous base much as alkaline salts prevent the complete crystallization of sugar. It is also important to add that after repeated crystallization aconitine always retains mechanically a certain amount of the amorphous base. This can be completely got rid of by transforming the aconitine into a salt and by regenerating the alkaloid from this salt after being thoroughly freed from the mother liquor. In this way chemically pure and crystalline aconitine may be obtained. The purity may be determined by the melting point being 183 to $184^{\circ}C$ or by allowing an acidulated and ethereal solution to which carbonate of soda has been added to slowly evaporate. If the entire mass crystallizes it is pure but if the last drop dries into a varnish picraconitine must have been present.

Dr. Wright concludes his most valuable report on the aconites by saying: The questions now remaining to be solved are essentially of a pharmaceutical and manufacturing nature and as such somewhat out of the province of the scientific chemical investigator these questions being simply the determination of the circumstances (as to soil climate age of plants &c.) which influence the relative proportions between the crystallizable aconitine and the non-crystalline bases naturally accompanying it so that the plants most suitable for the extraction of the alkaloids may be known, and the elaboration of the best method of separating the

MEDICINE.
Leaves
421
Herb
422

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**ACONITUM
palmatum****Bikhma Aconite.**

crystallizable from the amorphous substances on a large scale ' (*Year Book of Pharm* 1881 p 27)

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Medicinal Preparations—It is not necessary to enter into the properties of the aconite of European commerce. It is too well known to require to be treated of here and no definite information can be obtained regarding the **A. Napellus** of Indian origin. It is enough to have briefly indicated the modern advances which have been made and alongside of these to show the part which India must play before its aconite can either attain a larger commercial position or take the place in Indian medical practice of the imported article. It is more than likely that a large proportion of the aconitine found in the so-called **A. ferox** of India may be due to the exports of that drug having consisted of the roots of at least four species—**A. ferox**, **A. Lycototum**, **A. Napellus**, and **A. palmatum**—indiscriminately mixed together.

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§ I have found **Aconitum Napellus** an invaluable drug in the reduction of the temperature of sun stroke and pneumonia. As an external application I have found it to be a most useful anodyne in facial neuralgia. (*Surgeon J Parker Poona*)

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Aconitum palmatum, Don Fl Br Ind I 28

Habitat.—A perennial herb chiefly of the eastern temperate Himalaya extending from Garhwál to Sikkim the Mishmí Hills and along the north eastern lofty ranges forming the frontier of Assam to Manipur, and to the higher peaks of the Naga Hills extending into Northern Burma.

Botanic Diagnosis—*Stem* leafy erect simple 2 5 feet high glabrous. *Leaves* reniform deeply 5 lobed 4 6 inches in diameter sinus shallow segments cuneate ovate deeply and sharply cut *petioles* long. *Panicles* few flowered. *Flowers* large greenish blue on long pedicels *helmet* much vaulted hortly beaked rather higher than broad. *Follicles* 5 1 1½ inches long glabrous. *Seeds* with a plaited testa.

MEDICINE

Root.

427

Medicine—No definite information can at present be given regarding the roots of this plant. It was found plentiful on the loftier peaks north of Manipur where its roots are said to be poisonous. Samples of the roots sent from the Aka country (on the frontier of Assam) as those said to afford the arrow poison used by these wild hill tribes seemed to agree with roots from Manipur and from the imperfect descriptions which could be obtained from other sources it is probable that they are the roots of **A. palmatum**. The Aka roots on being chemically analysed by Dr Warden were found to be poisonous.

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§ *Fadwar khatai* is the name in Leh for the root of an aconite (probably **A. ferox**) that is imported from Nepal via Lhasa. It is called in the Panjáb *Nirbisi* by Bhoteas in Leh *Bonga* and by the Yarkandis *Farfi* it is poisonous. It is administered in cases of poisoning and in severe illness such as cholera and is carried as a talisman about the person. (*Surgeon Major J E T Aitchison Simla*) It is probable that the above remark written by Dr Aitchison on the proof copy of this work under **A. palmatum**, has little reference to that species but like most other facts regarding Indian aconites it is quite impossible to determine the species referred to. Dr Aitchison may probably be correct in attributing it to **A. ferox** but the Panjáb name *Nirbisi* (*Nir* free from, and *bisi* poison) is somewhat at variance with its being poisonous.

"Dr Dymock (*Mat Med West Ind*) suspects the *Bikhma bishma* HIND, *Wakhma* BOMB to be the root of **A. palmatum**, which would therefore be a non-poisonous species. The root is very bitter and contains a well defined bitter alkaloid it has no poisonous properties."

A. 428

The Sweet-flag

ACORUS
Calamus

In Sikkim the natives consider the root of *A. Palmatum* as not poisonous
(*Surgeon Major G King Calcutta*)

ACORUS, Linn Gen. Pl III 999

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A genus of aquatic herbaceous perennials (belonging to the Natural Order ARIOIDEÆ) comprising a number of forms which may with advantage be reduced to two species. Spike not enclosed by a spathe—the spathe forming a leaf appearing to continue the growth of the axis like a long ordinary leaf so that the spike seems to arise upon the side of a leaf and near the middle. Flowers all hermaphrodite composed of six green perianth leaves; six stamens opposite the perianth segments and a three celled ovary with sessile stigma.

Acorus Calamus, Linn Roxb Pl Ind Ed C B C 296

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THE SWEET FLAG

Vern—*Bach* ghori or *gor bach* HIND *Bach* BENG ASS *Vekhand*
gandhilo vaj *godu vaj* GUJ *Vekhand* MAR *Vekhanda* CUTCH
Gandhi lakri vach DUK *Vach* ugra *gandhaha* *shadgrantha*
SANS *Vaj* ARAB *Agre turki* PERS *Bariboj* warch PH *Vahi*
KASH *Vashambu* TAM *Vasa wasa* *vadaja* TEL *Vashanpa*
MAL *Bajé* KAN *Linhe* BURM

In connection with the Telugu name *Vasa* it may be noted (on the authority of **Moodeen Sheriff**) that the word *Ati-wasa* which means greater *Vasa* is applied to the root of *Aconitum heterophyllum*, and that *Ati-visha* or greater poison is the name for *A. ferrox*. These two names must not therefore be confounded with *Vasa Acorus Calamus*.

Habitat—A semi aquatic perennial with indefinitely branched rhizomes a native of Europe (P) and North America. Cultivated in damp marshy places in India and Burma altitude 3 000 to 6 000 feet exceedingly common in Manipur and the Nagá hills often a weed of cultivation spreading apparently from the walls dividing the fields. Originally a native of Asia and probably introduced into Europe. Some difference of opinion prevails as to whether this is the *Calamus Aromaticus* of the Greeks which **Royle** regards as an *Andropogon* but it seems probable that this was the plant.

Botanic Diagnosis—*Rhizome* indefinitely branched creeping in mud with stout joints and large leaf scars cylindrical or somewhat compressed about $\frac{1}{4}$ inch in diameter smooth pinkish or pale green the leaf scars brown white and spongy within. Gives off below numerous straight rootlets. *Leaves* few distichously alternate forming erect tufts at the extremities of the rhizome tapering into long acute points entire smooth scapes arising from the outer leaves. All parts but especially the rhizome aromatic.

Properties and Uses—

Oil and Perfumery—An essential oil is obtained from the leaves which is used in England by perfumers in the manufacture of hair powder. From the rhizome a pale or dark yellow oil with the strong penetrating odour of the root and an aromatic bitter burning camphoraceous flavour (due to the presence of a glucoside known as *Acorin*) is obtained by distillation.

OIL
431
Perfumery
432

The volatile oil and *acorin* may be said to be the two substances to which Sweet flag owes its properties.

Medicine—The aromatic rhizome or root stock is considered emetic in large doses and stomachic and carminative in smaller doses (*U C Dutt Civil Medical Officer Serampore*). It is a simple useful remedy for flatulence colic or dyspepsia and a pleasant adjunct to tonic or purgative medicines. It is also used in remittent fevers and ague by the native doctors and is held in high esteem as an insectifuge especially for fleas. In **Voigt's Hortus Suburbanus Calcuttensis** occurs the

MEDICINE
Root-stock.
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**ACORUS
Calamus****Opinions regarding the Sweet-flag****MEDICINE**

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following (taken from *Thomson's Mat Med*) The root has been employed in medicine since the time of Hippocrates By the moderns it is successfully used in intermittent fevers even after bark has failed and it is certainly a very useful addition to cinchona It is also a useful adjunct to bitter and stomachic infusions' In European practice this medicine is not much if at all used The rhizome is sold to a small extent by chemists in England and in Scotland it is regarded useful to clear the throat before taking part in any public performance for this purpose a small piece is chewed for a few minutes It holds however an important position amongst the drugs regularly prescribed by Indian doctors The Sweet flag is the only plant which can be said to be taken by the Nagás as medicine and it is also much valued by the Manipuris especially in the treatment of coughs or sore-throat

Opinions of Medical Officers—§ In Meerut the rhizome with *dhang* and *ajowain* in equal parts, is powdered and used as a fumigation in painful piles (*Surgeon Major W Moir and Assistant Surgeon T N Ghose Meerut*) I found the root extremely useful in the dysentery of children and also in bronchitic affections—*vide Ind Med Gazette* for February 1875 page 39 for further particulars" (*Surgeon B Evers M D Wardha*)

Aromatic bitter stimulant useful as an expectorant in bronchitis
As a stomachic in flatulency in the form of infusion

Bruised root

1 oz

Boiling water

14

'Dose 1 ounce and a half thrice daily (*Surgeon C M Russell Sarun*)

The root rubbed up with water or spirit is used as a counter irritant to the chest in the catarrh of children It is generally supposed that the smell is disliked by the cobra on which it produces a narcotic effect For this reason it is cultivated near dwellings and chewed by snake catchers (*Surgeon H McCalman M D Ratnagiri Bombay*) Bach is commonly used to allay distressing cough I use it much for this purpose with excellent results A small piece of the dried root stock kept in the mouth acts better than many cough lozenges It produces a warm sensation in the mouth and a beneficial flow of saliva' (*Surgeon Major R L Dutt M.D Pubna*) Used as a tonic and stomachic Combined with chiretta is used by natives for intermittent fever also in dysentery (especially of native children) (*Surgeon H W Hill Mánbhum*) In finely powdered 10-grain doses taken internally with warm milk allays the tingling sensation of the throat in catarrhal sore throat' (*Assistant Surgeon Devendro Nath Roy Calcutta*) 'I have myself used it in coughs and sore-throats with some success It seems to stimulate the mucous membrane and the salivary glands the result being an increased secretion and relief of dryness of throat and harassing dry cough I used to chew a small piece now and again (*Surgeon D Basu Faridpur*) Useful in dysentery a decoction is made from the bruised root Dose one ounce and a half (*Dr W Forsyth Civil Medical Officer Dinapore*) Is a tonic and stomachic useful in cases of dyspepsia loss of appetite and debility" (*Brigade Surgeon F H Thornton Monghyr*)

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'The rhizome is emetic, nauseant, antispasmodic, carminative, stomachic, stimulant and insecticide As an emetic it is more nauseant and depressant than Ipecacuanha, and it is therefore useful in most of the diseases in which the latter is indicated, including dysentery It is one of the two vegetable drugs in this country which act efficiently as emetics in so small a dose as 30 grains It should not be used in more than 35 grains, and in 40 grains its action is very violent and obstinate It

Opinions regarding the Sweet-flag

ACORUS
Calamus.

MEDICINE.

is a good remedy in asthma to relieve which it should be first used in pretty large or nauseant doses (15 to 20 grains) and then repeated every 2 or 3 hours in smaller or expectorant doses (10 grains) till relieved. Among other diseases which are most benefited by this drug are bronchial catarrh, hysteria, neuralgia and some forms of dyspepsia. The rhizome can also be used in the form of a tincture or an infusion. (*Hony Surgeon Moodeen Sheriff Khan Bahadur Madras*)

436

It is used in Madras as a flea powder and is very effective" (*Deputy Surgeon General G Bidie C I E Madras*). A time-honoured domestic remedy for cough and fever especially in children even of the tenderest age given grated into a paste with the milk of the mother. Is administered in the same form in colic of children. Has been used here in the form of infusion (1 in 20) in bronchial catarrh and febricula. In the former disease its efficacy is increased in combination with infusion of liquorice root (1 in 20). It is also supposed to destroy fleas for which purpose an infusion of the root is used" (*Surgeon Major Lewis Charles Nanney Trichinopoly*). Useful as an external application on the abdomen of children suffering from flatulent colic. The root is burnt to cinder, mixed either with cocoanut or castor oil and smeared over the abdomen" (*Hony Surgeon Peter Anderson Guntur Madras Presidency*). 'A carminative, tonic and insectifuge. Root is slightly burnt and powdered grains 2 to 10 for a dose. An infusion sprinkled in infected places drives away vermin" (*Surgeon Major A F Dobson Bangalore*). Used largely by the natives in the flatulent colic of infants. The rhizome is roasted over a light and a small portion rubbed down with human milk is given internally and also used as a paste over the umbilicus (*Hony Surgeon Easton Alfred Morris Negapatam*). Antispasmodic and sedative to the nervous system used for colic of young children both externally and internally" (*Surgeon Major Henry David Cook Calicut Malabar*). The root stock is burnt to charcoal then pulverised 10 to 20 grains of this powder mixed with water is given to counteract the effect of croton. Is considered as an antidote in cases of croton poisoning" (*Surgeon W A Lee Mangalore*). Rhizome powder dose 20 to 40 grains infusion (1 oz to 10 oz boiling water) dose 1 to 2 oz (*Pharm Ind*). Stomachic and carminative insecticide (*Apothecary Thomas Ward Madanapalle Cuddapah*). Is common in Southern India it is antispasmodic and carminative often used for children also applied externally on the abdomen to expel flatus. It is used to keep moths from woollen goods and fleas from rooms &c" (*Surgeon Mark Robinson Coorg*). Used internally in the shape of decoction for children as a carminative dose grains v also externally in the form of paste applied to the abdomen in tympanitis" (*Surgeon Major J J L Ratton M D Salem*). Is given internally by first burning the end of the root and rubbing it down in milk (as a vehicle) for flatulence &c. It is also applied externally over the abdomen for flatulence in infants" (*Surgeon Major Lionel Beech Cocanada*).

'The burnt root acts as an astringent in infantile diarrhoea" (*Assistant Surgeon Ruthnam T Moodelhar Chingleput, Madras Presidency*). In 3 grain doses it is very effectual in relieving the colic of small children" (*Surgeon Major John North Bangalore*).

437

The rhizome is largely used in North Bengal in coughs and sore throats a few thin slices are given to chew, having been slightly warmed before the fire it is more efficacious than cough lozenges in relieving the irritation of the throat. It is also used as a carminative in dyspepsia. In Western India it is used externally as an application on bruises and rheumatism rubbed up with the spirits made from the Cashew nut fruit" (*Surgeon Major C T Peters, South Afghanistan*).

ACROSTICHUM scandens**The Red Cedar**

Stimulant 1 to 5 grs emetic one to two scruples It is used in cases of colic and dyspepsia when applied externally in the form of a paste over the head it relieves headache when rubbed over the nose it arrests the progress of influenza and bronchial catarrh (*Surgeon W Barren Bhui Cutch Bombay*) * A small piece kept in the mouth and its juice swallowed relieves cough and tickling of the throat it produces salivation and an agreeable warmth (*Assistant Surgeon Shib Chunder Bhutta Chary Chanda Central Provinces*)

Chemical Composition—§ The dried rhizome yields according to the editors of the *Pharmacographia* 13 per cent of a neutral yellowish essential oil of an agreeable odour which Curratow has shown contains Tæpene Faust has isolated a bitter semi fluid nitrogenous glucoside acorin while Fluckiger and Hanbury have obtained a very bitter crystal line principle (*Surgeon C F Hislop Warden Prof of Chemistry Calcutta*)

Spirit
438

Spirit—It is stated that a considerable amount of the rhizomes of this plant are used in flavouring gin beer &c For this purpose the market is said to be chiefly supplied from the river banks in Norfolk Formerly the leaves of the Sweet flag were spread over the floors of churches and cathedrals (especially in Norfolk) upon great occasions the pressure of the foot causing a pleasant odour The rhizome is said to be used in India in the preparation of an aromatic vinegar

Vinegar
439

Trade—Dr Dymock remarks that the drug imported into Bombay comes chiefly from the Persian Gulf it brings about ₹3 a maund of 37½ seers There is a very considerable trade in this article done in Calcutta

ACROCARPUS, W & A Genl Pl

A genus containing only a single species (belonging to the sub-order MIMOSÆ of the Natural Order LEGUMINOSÆ)

440

Acrocarpus fraxinifolius Wight *Fl Br Ind II* 292 Wight, *It, t* 254

RED OR PINK CEDAR (of tea planters)

Vern—*Mandania* NEPAL *Mad ling* LEPCHA *Malai kone* TINNEVELLY *Kalinj* NILGHIRIS *Kilingi* BURGHERS *Hantige belanj* havulige KAN

Habitat—A lofty deciduous tree found in the Eastern Himálaya and lower hills down to Chittagong ascending to 4000 feet also in South India and Burma

TIMBER

Structure of the Wood—Sapwood white heartwood light red moderately hard Weight 39 lbs per cubic foot

441
DOMESTIC
USES

Used by planters in Darjiling for tea boxes and planking in the Wynaad for building and furniture and in Coorg for shingles

442

In the *Tropical Agriculturist* for May 1883 some interesting information is given regarding wood for tea boxes Mr Bruce writes I have used this timber more perhaps than any other for tea boxes and tea house furniture in general and if it has been well seasoned it is as good a wood as could be procured for the purpose

443

ACROSTICHUM, L Syn Fil, 399

Acrostichum (Stenochloena) scandens, Willd, FILICES

A common fern in the warmer parts of Ceylon

Fibre—Dr Trimen informs me that ropes are made in Ceylon from this plant

A. 443

The Baneberry

ACTINIOPTERIS.

ACTÆA, Linn *Gen Pl*, I, 9

444

A genus of herbaceous perennials (belonging to the Natural Order RANUNCULACEÆ) comprising only two species inhabiting the cold temperate regions of Europe North Asia and North America

Leaves alternate ternately compound *Flowers* small regular in short crowded racemes *Sepals* 3 5 unequal petaloid *Petals* 4 10, small spatulate or wanting *Stamens* many slender *Carpel* 1 many-ovuled *stigma* sessile, dilated *Fruit* a many-seeded berry

(Compare with the allied genus CIMICIFUGA which will be found to differ chiefly in the longer racemes (3 8 inch) and dry dehiscent capsule instead of a succulent berry)

Actæa spicata, Linn *Fl Br Ind I* 29

445

THE BANEERRY

References — *U S Dispens 15th Ed 1560*

Habitat — Temperate Himálaya from Bhután to Hazára *Dist* — Europe North Asia North America

Botanic Diagnosis — *Leaflets* $\frac{1}{2}$ 2 inches ovate lanceolate entire or 3 lobed acutely serrate *Flowers* $\frac{1}{4}$ inch diameter white *Berry* black in the European and Himálayan form white and red in the American The two American forms are in popular scientific works treated as distinct species — **A alba** and **A rubra** The berries are very poisonous

Properties and Uses —

Medicine — The drug which in Europe and America is prescribed under the name of Tinctura Actæa racemosa is prepared from *Cimicifuga racemosa* and not from a species of *Actæa* **Stewart** remarks regarding *Actæa spicata* I have found no trace of its being used or dreaded by the hill people on the Panjab Himalaya It would be interesting to know whether this be correct for it is curious that so useful a plant should have escaped the notice of the natives of India Canadian doctors administer the root in snake bite and it is said to be attended with much success in the treatment of nervous diseases rheumatic fever chorea and lumbago **Mr Frederick Stearns** describes the root as violently purgative The berries were formerly used internally for asthma and scrofula and externally for skin complaints Baneberry Root is largely exported into Europe and used to adulterate the root of *Helleborus niger* but the former may readily be distinguished on section by the presence of radiating medullary bands while *Hellebore* has an entire or undivided substance An infusion of *Actæa* root is changed into black on adding a solution of persulphate of iron acting upon the tannic acid of the *Actæa*. No such change is effected upon an infusion of *Hellebore*

MEDICINE
The Root.
446

§ *Actæa racemosa* — A tincture of the root is a powerful nerve sedative and will often relieve severe neuralgia when all other drugs fail (*Dr S Westcott*) It would be worth while to try this drug as a substitute for *Actæa racemosa* which I find very serviceable in chronic rheumatism and uterine disorders (*Surgeon Major R L Dutt M D Pubna*) It seems probable that by *Actæa racemosa* is meant *Cimicifuga racemosa*, and in that case the above medical opinions should be transferred to the latter species See *Cimicifuga* and *Helleborus*.

ACTINIOPTERIS, Link *Syn Fil*, 246

447

A genus of ferns (FILICES) belonging to the tribe ASPLENIEÆ *Sori* linear elongated submarginal *indusium* the same shape as the sorus and folded over it placed one on each side of the narrow segments of the frond and opening towards the midrib

A. 447

**ADAMIA
versicolor****The Actinodaphne****448****Actiniopteris dichotoma**, *Bedd Clarke's Ferns, N Ind in Trans
Lin Soc, 1880***Syn**—*A RADIATA Link ACROSTICHUM DICHOTOMUM Forsk***Vern**—*Mor-pankhi mor pach N W P Mapursika BOMB***Habitat**.—Common throughout India on the lower hills of the peninsula Very characteristic of the Nilgiris up to altitude 2 000 feet and of Kumaon and West Nepal rare in the plains of India occurring as at Agra Delhi and Moradabad in crevices of rocks and in old masonry**Botanic Diagnosis**.—An exceedingly pretty fern like a miniature palm *Fronds* fan shaped 1 to 1½ inches in breadth composed of numerous dichotomous segments**MEDICINE****449****Medicine**—Used as an anthelmintic (*Atkinson*)§ Very common on old walls in the Deccan used as a styptic"
(*Surgeon Major W Dymock Bombay*)**450****ACTINODAPHNE**, *Nees Gen Pl, III 160*

A genus of trees or bushes (belonging to the Natural Order LAURINÆÆ) comprising 50 species of which 9 or 10 are Indian inhabiting the warm moist forests of the lower hills

Leaves sub-opposite or clustered at the ramifications and tips of the branches thick coriaceous penninerved *Flowers* dioecious sessile clustered in sessile fascicles in bud enclosed by imbricate caducous scales *Perianth* with a short tube broken into 6 sub equal leaves *Male flowers* with 9 perfect stamens arranged in three rows of three each the innermost having a gland on either side of the filament *anthers* all introrse 4 loculate *Ovary* immersed in the cup shaped tube of the calyx *style* tapering *stigma* dilated *Fruit* a berry placed in the disk or cup of the perianth

Very little of importance can be said regarding the Indian species of this genus The following are those best known —

451**Actinodaphne angustifolia**, *Nees Wight's Ic t 1841***Syn**—*LITSÆA ANGUSTIFOLIA Bl***Vern**—*Samkoh ASS Boltanaro GARO Tabongdeing MAGH Shwoaygyo nalingjo BURM***Habitat**.—An evergreen tree with the leaves rusty tomentose beneath met with in Eastern Bengal South India and Burma**452****A. Hookeri**, *Meissn***Syn**—*A LANCEOLATA Dals***Vern**.—*Pisa BOMB***Habitat**—A small tree or shrub of Sikkim and of the Eastern and Western Gháts of South India and in Kanára and Sattára and particularly at Mahableshwar**Medicine**—A cold infusion of the leaves is mucilaginous and is used in urinary disorders and in diabetes The oil of the seeds *Pisa tila* is used as an external application to sprains it is of a reddish colour and has a fatty odour (*Surgeon Major Dymock Mat Med 554*)**A. obovata**, *Hook f***Vern**—*Musindi NEP Pohor LEFCHA Laphauseh MECHI Cherritanga ASS***Habitat**—A tall tree (with large 3 nerved leaves) occurring in the outer Sikkim Himálaya Assam Khásia Hills and Sylhet**Adamia versicolor**, *Fortune A. cyanea*, *Wall*, and *A chinensis*, *Gard*Synonyms for *Dichroa febrifuga*, *Lour*, which see**A 453**

The Baobab.

ADANSONIA
digitata.

Adam's Apple—A name sometimes applied to the Lime or Lemon

Adam's Needle, see *Yucca gloriosa*

ADANSONIA, *Linn*, *Gen Pl* I 209

454

A genus (belonging to the Natural Order MALVACEÆ and the Tribe BOMBACEÆ) containing in all only two species one met with in tropical Africa the other in Australia the former is cultivated in India *Leaves* digitate *Calyx* 5-cleft leathery *Petals* 5 exceeding the sepals, adnate below to the stamens *Style* divided into 5 10 branches *stigmas* radiating *Fruit* oblong woody indehiscent

A genus named after **Adanson** a celebrated French traveller, who lived in Senegal from 1749 to 1754

Adansonia digitata, *Linn* *Fl Br Ind*, I, 348

455

THE BAOBAB TREE, the SOUR GOURD or the MONKEY BREAD TREE OF AFRICA

Vern—*Gorakhchuncha* or *gorakh chints choyari chinch* (The horse's tama rind *gorakha amli*) BOMB *Gor amli chora gorak amali* or *gorakh amli* HIND *Gorakha amli bukha* GUJ *Gorakh chinch* CUTCH *Kalprishkh* or *kalbrishkh* AJMER F DELHI *Haiki khatyin* (the plant) DUK *Yilayti mli* MORAR *Anai-puli paparapuli* (the plant *anai puliya marram*) TAM *Hujed*, ARAB

Dr Dymock says the Bombay name *Gorakh* is derived from the name of a celebrated Hindu ascetic who probably taught his disciples under this tree *Gorgkh* and his disciple *Machindar* were well known *Sadhus*

Habitat.—This is one of the largest and longest lived trees in the world Trunk short thick often found 30 feet in diameter branches spreading

Cultivated to a small extent in some parts of India but deserves to be extended originally introduced by Arab traders who call it *Habhabu* It is chiefly met with in Bombay being plentiful on the coast Four or five venerable specimens are in the Futtehpore district The abandoned capital Mandoo near Indore is overrun with *Adansonia*s as other ruins are with the *pipul* (*R T H Morar*) Pretty common about Madras at one time it was proposed to cultivate it on account of the fibrous material in its bark (*Deputy Surgeon General G Bidie Madras*) 'Specimens are to be seen at Lucknow and at Allahabad (*Brigade Surgeon G A Watson Allahabad*) It is also being experimentally cultivated in the Sunderbuns I here is a good specimen in the Barrackpore Park and a small one on the Calcutta Maidan a little beyond the Cathedral In Africa it is said to extend through the continent from Senegal to Abyssinia It has also been introduced into the West Indies **Humboldt** speaks of this tree as 'the tree of a thousand years' the oldest organic monument of our planet **Adanson** made a calculation to show that a tree 30 feet in diameter was over 5000 years of age He saw two trees 5 to 6 feet in diameter on the bark of which were cut European names one dated in the 14th and another in the 15th century **Livingstone** says I would back a true *Mowana* (the name given to this tree in the neighbourhood of Lake Ngami) against a dozen floods provided you do not boil it in salt water but I cannot believe that any of those now alive had a chance of being subjected to the experiment of even the Noachian deluge

Properties and Uses—

Gum.—\$ The bark when wounded yields a large quantity of white semi fluid gum, which is odourless and tasteless, and has an acid reaction

GUM.
456

A. 456

ADANSONIA
digitata.**The Baobab.****FIBRE**
457

Under the microscope, in addition to amorphous matter a considerable number of minute bodies with sharp projecting rays are visible. The ash contains a large quantity of lime. Gum Baobab is insoluble in water and appears to be allied to gum tragacanth. (Surgeon C F H Warden *Prof of Chemistry Calcutta*)

Fibre—The bark yields a strong useful fibre.

In Senegal it is made into ropes and woven into cloth. The hard outer bark is first chopped away and the inner bark stripped off in large sheets. These are beaten with sticks to remove the pithy matter. The fibre is then sun dried and pressed into bales. Small trees yield finer and softer fibre than large ones. The Africans use the fibre for making rope twine and sacking. In India elephant saddles are made from it. The fibre imported into England from Portuguese West Africa readily sold at £9 to £15 a ton. It produces an exceedingly strong paper suitable for bank notes and has received much attention. The slow growth of the tree and the careful cultivation and shading it requires while young renders it however a precarious source of paper fibre (*Spons Encycl*).

Chemical Composition—§ From the bark Walz extracted a non nitrogenous principle which crystallizes in needles and prisms and which he named *Adansonia*. The root contains a red colouring matter soluble in water and in absolute alcohol. From its aqueous solution it is deposited as a red powder. (Surgeon C F H Warden *Prof of Chemistry Calcutta*)

Medicine—The FRUIT has a mucilaginous PULP having a pleasant cool subacid taste like cream of tartar a good refrigerant in fever (*Bom Gaz VI 14*). Used in Africa in dysentery. LEAVES dried and powdered constitute the Lalo of Africans used to check excessive perspiration. The BARK is antiperiodic. A useful substitute for quinine in low fever (*Bom Gaz VI 14*).

The pulp is used in Bombay with butter milk in diarrhoea and dysentery.

The WOOD is said to possess antiseptic properties (*Bom Gaz XIII Part I 24*). The SEEDS are said to possess febrifugal properties.

In a recent correspondence with the Government of India regarding the desirability of producing a revised edition of the *Indian Pharmacopœia* it was proposed this plant should be excluded from the new edition. The *U S Dispensatory Ed 15th* says of it however that the leaves and the bark abound in mucilage. Dr Duchassaing of Guadaloupe West Indies and M Pierre of France commend the bark highly as an antiperiodic. It is said to be acceptable to the stomach and to produce no other observable physiological effect than increase of appetite increased perspiration and perhaps diminished frequency of pulse. An ounce may be boiled in a pint and a half of water to a pint and the whole taken in a day (*U S Disp Ed 15th 1561 Four de Pharm se Ser XIII 412 and 421*).

In the *Pharm India* it is stated that according to Dr R F Hutchinson its action is not due to any astringent property which it possesses but to its virtues as a refrigerant and diuretic. Dr Gibson thinks that the properties of this tree are well deserving of attention.

§ The pulp is said to be a useful external application in skin diseases—no personal experience (*Surgeon F Parker Poona*). 'Useful astringent in diarrhoea and dysentery dose 1 to 20 grains' (*Surgeon W Barren, Bhuj, Cutch Bombay*). 'Decoction used in bilious headaches' (*Surgeon Major F F L Ratton M D Salem*).

Food—The fruit which varies in size and shape, is frequently 12 inches long or only as large as a lemon and resembles a gourd contains many brown seeds, is somewhat acid, and makes a cooling and refreshing drink.

MEDICINE
Pulp
458
Leaves
459
Bark
460
MEDICINE
Wood
461
Seed.
462

FOOD
The Fruit.
463

Red Wood

ADENANTHERA
pavonina.

It is also eaten by the natives Major Pedley in his expedition in search of Mungo Park lived almost exclusively on it for twelve days In Gujarát the fishermen eat the leaves with their food and consider them cooling In Senegal the negroes use the bark and leaves powdered as a condiment

Structure of the Wood—Light soft and porous made into rafts to support fishermen in tanks It is readily attacked by fungi

Domestic Uses—Owing to the softness of the wood the stems of the Baobab trees are often excavated into living houses Livingstone describes one of these excavated trunks as sufficient to allow 30 men to lie down The bodies of men denied the honour of a burial are often in Africa suspended within these houses and soon become perfectly dry and converted into mummies without the necessity of being embalmed The ash of the fruit and bark boiled in oil is used as soap by the negroes The dry fruits are used as floats by the Indian fishermen

Leaves.
464
TIMBER
465
DOMESTIC
USES
Living
houses.
466
Soap.
467
Floats.
468
The Fruit.
469

ADELIA

Adelia castanicearpa, Roxb Syn for **Chaetocarpus castanicearpus**
EUPHORBIACEÆ which see

A. cordifolia, Roxb Syn for **Macaranga cordifolia, Mull Arg** which see

A. nerufolia, Roxb Syn for **Homonoya riparia Lour** which see

ADENANTHERA, Linn Gen Pl I, 590

470

A genus of trees or shrubs without prickles (belonging to the Natural Order LEGUMINOSÆ sub-order MIMOSEÆ) comprising in all some 4 species spread throughout the tropics of the Old World 2 being natives of India

Leaves bipinnate **Flowers** in spikes minute white hermaphrodite **Calyx** campanulate equally toothed **Petals** valvate cohering only at the very base **Stamens** 10 all free equalling the corolla **Seeds** scarlet

The word Adenantha is derived from the Gr ἀδών, an acorn or gland and ἀνθος a flower

Adenantha aculeata, Roxb see **Prosopis spicigera, Linn** LEGU
MIN OSÆ

A pavonina, Linn Fl Br Ind II 287 Wight, Ill t 84 (80)

471

RED WOOD (sometimes called RED SANDAL WOOD)

Vern—*Rakta kanchan rakta kambal ranjana* (sometimes also called *Rakta chandan* a name more correctly applied to **Pterocarpus santalinus**) BENG *Chandan* Ass *Bir mungara* SANTAL *Anai gun duman* TAM *Bandi gurivenda pedda guriginga* TEL *Manjati* MAL *Vul thorigunj* MAR *Bari gumchi hatti gumchi* DUK GUJ *Manjadi* KAN *Madateya* CINGH *Gung* MAGH *Ywaygyee* or *ywegyi* BURM *Recheda* AND

Habitat—A large, deciduous tree met with in Bengal South India and Burma

Botanic Diagnosis.—**Leaves** compound with 8 12 pinnæ and 12 18 obtuse leaflets **Racemes** short peduncled 2 6 inches long **seeds** bright scarlet

In Ceylon a nearly allied species occurs known as **A. bicolor**, with 6-8 pinnæ and leaflets acute **Seeds** half black half red

Properties and Uses—

Gum.—*Spons Encyclopædia* mentions a gum obtained from this plant and known as *madatia*

Dye—The wood is sometimes used as a dye, but chiefly as a substitute for the true red sandal wood

GUM.
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DYE
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A. 473

ADHATODA.

Red-wood

OIL.
474
MEDICINE
Seeds
475

Leaves
476

Wood
477

FOOD
478

TIMBER
479

DOMESTIC
USES
The seeds as
weights
480
As Necklaces
481
Forming
Cement.
482
Tilak Paste.
483

Oil—The seeds yield an oil

Medicine—The powder made from the SEEDS is said to be a useful external application hastening suppuration § A grateful application over boils soothing the burning pain and hastening recovery It is also used to cure prickly heat (R N Gupta) The emulsion made by rubbing the seeds on a stone with water forms a cooling external application useful in head ache and in the early stages of inflammation (Surgeon J Anderson Bignor) Vāla powder mixed with honey is used in colic—no personal experience (Surgeon Major R L Dutt M D Pubna) A decoction is used by Kobirages in rheumatic affections The powdered seed rubbed with water is used to disperse boils (Surgeon J Parker Poona) Hakims use the powder in gonorrhœa (Surgeon Major W Moir and Assistant Surgeon T N Ghose Meerut)

A decoction is made from the LEAVES in South India and given as a remedy for chronic rheumatism and gout If used for any length of time it is said to be anaphrodisiac It is regarded as useful in hæmorrhage from the bowels and hæmaturia

§ The decoction is very useful as an astringent and tonic in atonic diarrhœa and dysentery (Assistant Surgeon Bhagwan Das Rawal Pindi) The wood powdered and mixed with water is said to be useful when applied to the forehead in cases of headache from over exertion or exposure (Surgeon Major C W Calthrop Morar) The red wood rubbed on stone with a little water and applied to the body is a certain temporary cure for prickly heat (Surgeon Major Henry David Cooke Calicut Malabar) Used as an emetic in 60-grain doses in warm water (Surgeon Major J J L Ratton M D Salem) It is used as an external application in orchitis (Surgeon Major J F Fitzpatrick M D Coimbatore)

Food—The seeds are sometimes eaten as an article of food

Structure of the Wood—Heartwood red hard close-grained durable and strong

The timber is used in South India for house building and cabinet making purposes

§ This is sometimes confounded with the *Pterocarpus santalinus*, but the latter yields the red sandal wood of commerce which is largely exported from South India (Deputy Surgeon General G Bide Madras)

Domestic Uses—The bright scarlet seeds are used as weights each being about 4 grains they are also strung and made into necklaces Powdered and beaten up with borax they give a good cement The red paste (*tilak*) made by rubbing the wood upon a moist stone is used by the Brahmins to colour the forehead after bathing

ADHATODA, Nees, Gen Pl II 1112

A genus of sub-herbaceous bushes (belonging to the Natural Order ACANTHACEÆ and the tribe JUSTICIEÆ) comprising in all some six species, distributed through tropical India south tropical Africa and Brazil

Leaves opposite entire arising from swollen nodes *Flowers* purple or white crowded into a bracteated spike sub-sessile each flower having three bracts the outer largest and persistent *Calyx* campanulate 5 fid lobes lanceolate *Corolla-tube* short limb 2 labiate the posterior lip erect, the anterior broad recurved 3-fid *Stamens* 2 each with 2 large diverging anther-cells one much higher than the other *Ovules* 2 in each cell *placenta* not rising elastically from the base of the capsule

The word Adhatoda is derived from the Tamil name for the Indian species

A. 483

Uses of Adhatoda.

ADHATODA
Vasica

Adhatoda Vasica, Nees Fl Br Ind IV

Syn.—JUSTICIA ADHATODA Linn

Vern.—*Arusā arusha adaisā adulasā adulasō adārsa* HIND. BOMB ;
Bakas vāsaka BENG *Adulsa* MAR ; *Aduso* GUJ ; *Arātōrd* DUK ;
Bhekkar JHELUM *Basuti* BEAS *Bekkar* SALT RANGE ; *Tora bayja*
 TRANS INDUS *Bashangarūs* KUMAON *Arus vāsaka*, *vajidantakaha*
atarusha SANS *Rus* OUDH *Basung* URIYA *Adhatoda* TAM ;
Adasara or *addasaram* TEL *Atalōtakam* MAL ; *Teesha* NAGā
Kath alesi NEPAL

Bansa vāsā bahikat (?) HIND in *Baden Powell's Pb Prod*, I 365 he
 also gives the vernacular names *Behskar* *bhekar* p 565

Habitat.—A small, sub-herbaceous bush often gregarious found every
 where in Bengal and in the Sub-Himālayan tracts ascending to 4 000
 feet in altitude

Properties and Uses—

Dye—A yellow dye obtained from the leaves by boiling is used for
 dyeing coarse cloth It gives a greenish blue when combined with indigo
 This property is not apparently known to the Nagās who cultivate the
 plant to shade the approaches to their villages I repeatedly asked if
 they prepared a dye from it and was told that they did not but that they
 used the stems for divining

Medicine.—The LEAVES and the ROOT of this plant are considered a very
 efficacious remedy for all sorts of coughs being administered along with
 ginger The medicine was considered so serviceable in phthisis that it
 was said no man suffering from this disease need despair as long as the
vasaka plant exists (*U C Dutt Civil Medical Officer Serampore*)
 It is often administered along with honey the fresh juice or a decoction
 with pepper being made into a cough mixture *Dr Irvine* gives the dose
 as $\frac{1}{2}$ oz to 1 oz of the decoction and states that the price of the drug in
 Patna was 1 anna per lb in the year 1848 The *Pharm India* states that
 strong testimony has been given in favour of the remedial properties of this
 plant drawn from personal experience in the treatment of chronic
 bronchitis asthma &c when not attended with febrile action The
 FLOWERS and the FRUIT are bitter aromatic and antispasmodic The
 FRESH FLOWERS are bound over the eyes in cases of ophthalmia The
 flowers leaves and root but especially the flowers are supposed to
 possess antispasmodic qualities They are bitterish and sub aromatic
 and are administered in infusion and electuary (*Ainslie*) The leaves
 are used as a cattle medicine (*Gamble*)

Special Opinions—§ Leaves recently dried are also smoked in cases of
 asthma they produce very beneficial effects Hospital Assistant *Gopal*
Chunder Gangooly of the Noakhaly Dispensary who is subject to
 asthma has used the leaves in this form and testifies to their property
 (*Assistant Surgeon Anund Chunder Mukerji Noakhally*) The leaves
 made into cigarettes are used in asthma they act as an antispasmodic
 (*Brigade Surgeon F H Thornton Monghyr*) Decoction of fresh leaves
 was found to be very useful in bronchial catarrh (*Surgeon C F W*
Meadows Burrisal) The dried bark when smoked relieves asthmatic
 fits strong decoction of it in subacute bronchitis did not produce in my
 hand much benefit as an expectorant (*Assistant Surgeon Devendro*
Nath Roy Calcutta.) There are two varieties one with red and the
 other with white flowers The first is medicinally much more important
 An infusion is used in bronchitis and consumption A fluid extract of
 the leaves and flowers would be a desirable preparation for trial (*Sur*
geon Major R L Dutt M D Pubna)

“Excellent expectorant dose 1 to 20 grains in chronic bronchitis and
 asthma” (*Surgeon W Barren Bhuj, Cutch, Bombay*) A fomentation

484

DYE.
485

MEDICINE.
 Leaves
 486
 Root
 487

Fruit.
488Flowers.
489

Leaves
 smoked
 490

Bark.
491

ADIANTUM
Capillus-Veneris**The Maiden hair Fern****MEDICINE**

with a strong decoction of the leaves is considered efficacious in rheumatic pains and in neuralgia. Also useful in reducing swellings' (*Hony Surgeon P Kinsley Chicacole Ganjam Dist, Madras Presidency*). This shrub is very common in Mysore and the powdered root is used by native doctors in cases of malarial fever' (*Surgeon Major John North Bangalore*). The juice of the leaves has been used as an excellent expectorant when combined with some native medicines also used by native doctors as a diuretic in dropsical affections attended with anæmia (*Surgeon Major F F Fitzpatrick M D Coimbatore*). 'Decoction is used to quench thirst in fever' (*Surgeon Major F F L Ratton M D Salem*).

The juice of the leaves is used for diarrhoea and dysentery. It is considered especially useful in hæmoptysis and bleeding in dysentery (*Surgeon Major F Robb Ahmedabad*). Is a useful refrigerant in fever given as decoction (*Surgeon Major John Lancaster Chittore*).

FODDER
492
TIMBER
493

Fodder—Not browsed by any animals except occasionally by goats.

Structure of the Wood—White moderately hard.

The timber of the thicker stems is used for gunpowder charcoal and as a fuel for brick burning.

§ Though only a shrub it is valuable as yielding a good charcoal for gunpowder. Specimens of the wood may be got an inch in diameter. It is quite the characteristic plant of the lower hills (*Baden Powell Pb Prod I 565*).

DOMESTIC
USES
494

Domestic Uses—The stems are used in the Nagá Hills for divining and to foretell omens. The twig is held in the left hand and rapidly cut into thin slices an incantation being repeated all the while the prognostications are based upon the number of times the heart shaped dark central wood turns towards or away from the operator. The idea of medicine seems scarcely to have occurred to the Nagá and he does not appear to attribute to this plant any virtues other than those described.

The *rus* is extensively employed in the construction of the fascine like supports of mud wells. The smaller branches are exceedingly pliant and are worked round and round in a sort of neat triple plait. The leaf is held to possess high qualities as a manure and is scattered over the fields just before the rainy season commences. It is then worked into the soil with the plough and left to decay with the moisture and thus form mould. As fuel it is almost exclusively used in the process of boiling down the cane juice and is collected into large heaps some days prior to the cutting down of the sugar cane (*Oudh Gaz, III 72*).

Manure
495**Fuel**
496**497****ADIANTUM, Linn Syn Fil 113**

A genus of Ferns belonging to the Tribe PTERIDÆ recognizable from all the other ferns (except some LINDSAYÆ) by the texture and one sidedness of their segments veins bifurcating but not anastomosing (except in the small section HEWARDIA). *Sori* marginal varying in shape from globose to linear sometimes confluent. *Indusium* of the same shape as the sorus being a modification of the margin of the leaf thrown over the sorus it is free from the frond except at the edge. *Capsules* attached to the under-surface of the indusium.

A large genus having its head quarters in tropical America comprising some 80 species 9 of which are met with in India.

498**Adiantum Capillus-Veneris, Linn Syn Fil, 123****THE MAIDEN HAIR FERN**

Vern—*Dámúli* KASHMIR *Krwatsei* (*bisfáí*) TRANS INDUS; *Parsha warsha* (a corruption of *para saydashán* **Mooddeen Sheriff**) SALT RANGE (**Stewart**) *Mubáratá* KUMAON (**Atkinson**), *Pursha, hanstrá*

A. 498

Maiden-hair Ferns.

ADIANTUM
caudatum.

mubāraka HIND Shīr or shair ul jin, ARAB (Murray's Drugs of
Sind) Sīr slā-peshāne PERS (Dr Rice NEW YORK) Hanspadi GUJ

Habitat.—A graceful delicate fern of damp places in rocks walls, or wells found chiefly in the Western Himālaya ascending to altitude 8 000 feet but found also far to the east in the valley of Mānipur extending to the mountains of the Burma Mānipur frontier and to Chittagong. It is common in the Panjab descending even to the plains where it is found in wells and damp places. This plant is quite common in South India—see *Beddome's Ferns* (Deputy Surgeon General G Bidie C I E Madras) Mr O B Clarke in his *Ferns of Northern India* gives its distribution as Malabar to Bombay to Ceylon (rare) from Kābul to England and Morocco in tropical and temperate Africa and America Queensland.

Botanic Diagnosis.—*Fronde* usually 2 pinnate segments $\frac{1}{2}$ 1 inch broad the base cuneate the outer edge rounded, deeply lobed from the circumference towards the centre the lobes often again bluntly crenate *petiole* near the centre *Sori* roundish or obreniform

Properties and Uses.—

Smith's *Economic Dictionary* (1882) states that this is the plant used in the preparation of the so called *Sirap de Capillaire* of Europe. This syrup is largely used in Italy and Greece in the treatment of chest complaints. *A. pedatum* Linn is also extensively used for this purpose being exported from Canada. Dr Dymock draws my attention to the fact that *A. pedatum* is the French official plant and that *A. Capillus-Veneris* is allowed as a substitute only. The former is a common North West Himālayan plant. *Sirap de Capillaire* is imported into India but might be prepared in the country to an unlimited extent since at least four species of *Adiantum* are exceedingly common plants, especially *A. caudatum*.

Medicine.—It is more than likely that the bulk of *Adiantum* sold medicinally in India is the true maiden hair fern *A. Capillus-Veneris*, although most writers on Indian drugs attribute this to *A. venustum*.

Dr Irvine says *Hans Raj shair ul jin* Venus's hair grows at Patna but brought from Nepal used as heating and febrifuge. Dose 20 to 30 grains price 5 annas per lb. In the Panjab the leaves along with pepper are administered as a febrifuge and in South India when prepared with honey they are used in catarrhal affections.

It is probable however that the official root sold in the Panjab bazars under the name of *Baisfai* is a species of *Polypodium* which see

Adiantum caudatum, Linn *Syn Fil 115*

Vern.—Aahsarita ka jari kangharī gunkirī PB Mayurashukhā SANS
Mayurshika CUTCH Mylekondai IAM

Habitat.—An exceedingly common plant in many parts of India Bengal N W Provinces the Panjab Madras Bombay &c covering nearly every old wall in shady places, fronds rooting at the tip and thus forming new plants.

Botanic Diagnosis.—*Fronde* simply pinnate tomentose often elongated into a tail which generally roots at the tip. *Segments* (or pinnæ) $\frac{1}{2}$ $\frac{3}{4}$ inch long by $\frac{1}{4}$ inch broad dimidiate nearly sessile the lower edge straight and horizontal the upper rounded more or less cut. *Sori* roundish.

Properties and Uses.—

Ainslie says that in the Island of Bourbon the fronds of this species as also of the preceding are used in the preparation of *Sirap de Capillaire*. Mr Baden Powell (*Pb Prod I 384*) associates this with *A. venustum* and other species, and gives them the vernacular names *pari siyā-*

Sirap
de Capillaire.
499

MEDICINE.
Fronde.
500

501

Fronde.
502

ADIANTUM
lunulatum

Maiden-hair Ferns.

MEDICINE
503

504

washán and *hansuráj*. He adds An astringent and aromatic said to be emetic in large doses also tonic and febrifuge This is the fern which is used in making *Capillaire Syrup* It would be interesting to know if a syrup was actually prepared in the Panjáb from this plant or if **Mr Baden Powell** has simply associated the Panjáb plants with the European drug (See **A Capillus-Veneris** and **A pedatum**, the plants used in Europe in the manufacture of the *Sirope de Capillaire*)

Medicine —§ Used externally as a remedy for skin diseases (*Surgeon W Barren Bhuj Cutch Bombay*) Said to be useful in diabetes (*Surgeon Major D R Thompson M D C I E Madras*)

Adiantum flabellulatum, Linn, Syn Fil 126

Habitat —Is very common in some parts of India It was found plentiful in the oak and mixed forests of Mánipur

Botanic Diagnosis —Nearly allied to **A pedatum**, smaller in size but much thicker or coriaceous Scales on the rhizome long linear chestnut coloured rachis often hairy repeatedly dichotomous segments glabrous more or less rounded and toothed the lower edge nearly straight *sori* $\frac{1}{10}$ inch broad

MEDICINE
505

506

Medicine —At Chuttuck I was told by a Mánipuri sepoy that the root was used medicinally

A lunulatum, Burm Syn Fil, 114 Hk Ic Pl, t 191

Vern —*Kali jhánt* BENG HIND *Mubarak rajahans* or *hansraj kan saraj* BOMB *Hansráj* GUJ *Ghodkhuri* MAR (Horse's hoof on account of the shape of the leaflets and the arrangement of the spores on under side like the horse shoe —*Surgeon Major W Dymock Bombay*)

Habitat.—This is unquestionably the commonest and most widely spread *Adiantum* in India In Bengal every hedgerow and old brick wall is covered with it also the rocks and banks of the lower hills throughout the greater part of India ascends to 4000 feet in damp glades it often becomes 2 feet in length rooting as in **A caudatum Linn**

Botanic Diagnosis —*Fronde* simply pinnate (in this respect allied to **A caudatum**) *Rachis* naked polished dark brown Segments glabrous $\frac{1}{2}$ to $1\frac{1}{2}$ inch long by $\frac{1}{2}$ to 1 inch broad subdimidiate the lower edge nearly in a line with or oblique to the petiole the upper edge rounded and usually more or less lobed

Properties and Uses—MEDICINE
Fronde
507

While this and the preceding species are plentiful everywhere throughout Bengal they do not seem to be collected for medicinal purposes and it is probable that the fern root (*hansraj*) to be had in Calcutta native druggists shops is imported and not procured locally **Dr Dymock** (*Mat Med., W Ind p 760*) seems to regard this as one of the species used medicinally in Bombay (See under **A venustum**.)

DYE
508

Dye —This and the preceding ferns and probably also several other species form ingredients in certain dye recipes

Medicine —§ In Gujarát this is known as *Kalo Hansráj* It is extensively used in the treatment of children for febrile affections The leaves are rubbed with water and given with sugar It is worked up with ochre and applied locally for erysipelous affections It is called *Kálo Hansraj* probably on account of the black colour of the stalks (*Surgeon Major F Robb Ahmedabad*)

“Demulcent dose of the decoction one to two ounces Used externally as a cooling lotion in cases of erysipelas (*Surgeon W Barren Bhuj Cutch, Bombay*) “Very common in Madras but not so far as I know, used in native medicine (*Deputy Surgeon General G Bidie C I E, Madras*)

A 508

Maiden-hair Ferns

ADIATUM
venustum.**Adiantum pedatum, Linn** *Syn Fil, 125*

Habitat—North West Himalaya from Garhwál to Sikkim, nowhere very plentiful

Botanic Diagnosis—*Frond* herbaceous glaucous and glabrous with shining naked rachis once dichotomous main divisions flabellately branched and somewhat scorioid on either side central pinnæ 6-9 inches long and 1 to 1½ in broad

Properties and Uses—

This is the French officinal species used in the preparation of the *Siróp de Capillaire* The *United States Dispensatory* says of it An indigenous fern the leaves of which are bitterish and aromatic and have been supposed to be useful in chronic catarrhs and other pec oral affections A European species known by the vulgar name is the *A Capillus-Veneris* which has similar properties though feebler

A venustum, Don *Syn Fil 125*

Vern.—*Par e sty wa han hansraj* PERS HIND (in the BAZARS) *Shirul jun shirul jubal* ARAB The *Makhsan* gives *K li jháp* or *Jhant* as the Hindi name of this plant In Bombay it is chiefly known as *mubarak Mayirsikki* TAM

Habitat—A fern found in the Himalaya up to 8000 feet in altitude and chiefly in the North West extending to Afghanistan exceedingly plentiful in the fir forest north of Simla often forming for miles the most characteristic under vegetation

Botanic Diagnosis—*Fronds* 3 to 4 times pinnate *Rachis* slender polished naked *segments* rigid prominently veined and toothed upper edge rounded lower cuneate into the petiole *sori* 1 to 3 large roundish placed in a distinct hollow on the upper edge

Properties and Uses—

Medicine—It possesses astringent and aromatic properties is emetic in large doses it is also tonic febrifuge and expectorant This remark is given by Mr **Baden Powell** in his *Panjab Products* under *A caudatum*, *A venustum* and other species and it is probable that if all the preceding are not actually used indiscriminately or as substitutes for each other in different districts they might easily be so since they seem all to possess the same properties **Stewart** says that in Chumba it is pounded and applied to bruises &c and the plant appears to supply in the Panjáb most of the officinal *hansraj* which is administered as an anodyne in bronchitis and is considered diuretic and emmenagogue

Dr Dymock describes the drug obtained from *Adiantum* under the joint names of *A venustum, Don* and *A lunulatum Spr* The former plant is confined however to the North West Himalaya never descending below 3000 feet in altitude and is in fact much more temperate in its likings than any of the other supposed medicinal *Adiantums* It has never been collected in Bombay while the latter is plentiful and indeed is one of the most abundant ferns in India but is almost confined to the plains or warm moist valleys of the lower hills There can be no mistaking these two species—the simply pinnate fronds of *A lunulatum*, with segments (or pinnæ) sometimes as much as one inch in breadth is quite unlike the tripinnate frond of *A venustum* with its rounded deltoid and cuneate-toothed and strongly veined segments There should be no difficulty in separating these two plants, but it would seem more than probable that they are never sold mixed together although they may in different parts of India be substituted for each other *A Capillus-Veneris* is much more likely to be mixed with *A venustum*, since it is very plentiful in most parts of India (as for example in the Panjáb plains in wells) and very much

509

510

Siróp
de Capillaire.
511

MEDICINE
Fronds.
512

**ADINA
cordifolia.****Karam Timber**

resembles *A venustum*. Speaking of these two species collectively Dr Dymock however says The Native physicians consider the maiden hair to be deobstruent and resolvent useful for clearing the *primæ viæ* of bile adust bile and phlegm also pectoral expectorant diuretic and emmenagogue Used as a plaster it is considered to be discutient and is applied to chronic tumours of various kinds The Persian name is *Parsiawashan* In Arabic it has many names the best known are *Shir ul jinn* and *Shir ul jibal* (fairy's hair or mountain hair) (*Dymock's Mat Med W Ind*)

§ This is imported into Bombay from Persia as *Parisiyahwashan* but the people here often call it *Mubarak* and *Hansraj* Native writers on *Materia Medica* do not distinguish between the species of *Adiantum* The *Makhsan* gives *Kālô-jhânt* as the Hindi for *Parisiyahwashan* (*Surgeon Major W Dymock Bombay*)

It is recommended by Hakims for hydrophobia It is resolvent and is also used for the prevention of hair from falling For internal use it is given in the form of a syrup (*Assistant Surgeon F N Dey Feypore*)

A vapour bath medicated by a decoction from this plant is regarded useful in fever (*Surgeon G A Emerson Calcutta*) Very useful as a mild tonic especially during convalescence from fever' (*Surgeon F Anderson Bijnor*)

513

ADINA, Salisb Gen Pl II 30

A genus of trees or shrubs (belonging to the Natural Order RUBIACEÆ) comprising in all some six species distributed through tropical Asia and America four being met with in India *Adina* is referred to the Tribe NAUCLEÆ having the flowers collected into dense globose heads *Corolla* funnel-shaped *stigma* simple It is placed in the section of the Tribe said to have the ovaries free or nearly so

The genus may be diagnosed thus *Leaves* having large caducous stipules *Flowers bracteate densely crowded in solitary or panicle heads Calyx tube angled 5 lobed Corolla* funnel shaped with a long tube throat glabrous lobes 5 valvate *Stamens* 5 on the mouth of the corolla *filaments* short *Ovary* 2 celled *style* filiform *stigma* capitate or clubbed *ovules* numerous imbricated upon a pendulous placenta in each cell *Capsule* of 2 dehiscent cocci many-seeded

514

Adina cordifolia, Hook f & Bth Fl Br Ind, III, 24; Cor Pl I, t 53

Syn.—NAUCLEA CORDIFOLIA Roxb Fl Ind Ed C B C 172

Vern—*Haldū hardū kadāmī karam* HIND *Bangka heli kadām pet puria da kôm* BENG *Hardua hardū (haldū in Gazetteer)* C P *Kurumba komba sanko* KOL, *Karām SANTAL* *Bara kuram* MAL (S P) *Karam* NEPAL *Tikkoe* BAHRACH and GONDA *Hardū paspu kirmi* GOND *Holonda URIYA* *Shangdong GARO* *Roghu heli kadām* ASS *Manjakadambe* TAM *Daduga betta ganapa ban daru dudagu paspu kandi paspu kadāmī* TEL *Arsintega* MYSORE *Hedde yett ga-pettega arsanatēga yettada ahuaū* KAN *Hedē* MAR *Haladhwān* GUJ *Kolong* CINGH *Thaing* MAGH *Dhārdka damba* SANS *Hnaw* or *hnaubeng nhingpen* or *nhan ben* BURM

Habitat—A large deciduous tree found in the Sub Himalayan tract from the Jumna eastward ascending to 3000 feet in altitude and extending throughout the moister regions of India Burma and Ceylon It is common in the Western Peninsula especially in the forests of the Ratnagiri and Thāna Districts of the Konkan and in the forests of Surat and of Baroda, in Gujarāt from thence it extends south into the forests of Mysore is plentiful in the forests of the Upper Godavari and of Bhandara in the Central Provinces Is common in the mixed leaf shedding forests all over Burmā from Chittagong and Ava to Pegu and Martaban

Botanic Diagnosis—*Leaves* with petiole 2 to 3 inches long orbicular

A 514

| Adul Oil. | ADONIS |
|---|---|
| <p>cordate abruptly acuminate pubescent beneath <i>stipules</i> orbicular or oblong <i>Peduncles</i> 1 to 3 axillary and one headed <i>Heads</i> of flowers $\frac{1}{4}$ to 1 inch diameter <i>bracts</i> small towards the apex <i>flowers</i> yellow</p> <p>Medicine —§ The small buds ground with round pepper are sniffed into the nose in severe headache (<i>Rev A Campbell Santal Mission Pachumba</i>) Roots used as a medicine in Assam (<i>H Z Darrah Esq Assam</i>)</p> <p>Structure of the Wood —Yellow moderately hard even grained No heartwood no annual rings It seasons well takes a good polish and is durable but somewhat liable to warp and crack Weight 40 to 50 lbs</p> <p>It is good for turning and is extensively employed in construction for furniture agricultural implements opium boxes writing tablets gun stocks combs and occasionally for dug out canoes</p> <p>The <i>Bomb Gas XIII Part I 24</i> says this is a large handsome tree logs often more than 30 feet long from durability in water they are much prized for fishing stakes In the <i>Mysore Gas I p 48</i> occurs the following regarding this plant Wood like that of the box tree very close-grained light and durable but soon decays if exposed to wet</p> | <p>MEDICINE. 515</p> <p>TIMBER. 516</p> |
| <p>Adina Griffithu, Hook f Fl Br Ind, III 24</p> <p>Habitat —Khasia Mountains altitude 3 000 feet</p> <p>Botanic Diagnosis —<i>Leaves</i> shortly petioled elliptic oblong or obovate shortly acuminate <i>Heads</i> $1\frac{1}{4}$ inch diameter <i>corolla</i> glabrous; <i>bracteoles</i> short stiff conical spines</p> | <p>517</p> |
| <p>A polycephala, Benth Fl Br Ind, III 25</p> <p>Habitat —Sylhet and the Khasia Hills Chittagong Tenasserim and Moulemein</p> <p>Botanic Diagnosis —<i>Leaves</i> shortly petioled lanceolate caudate acuminate glabrous <i>Heads</i> in trichotomously branched panicles</p> | <p>518</p> |
| <p>A. sessilifolia, Hook f & Bth Fl Br Ind III 24</p> <p>Syn —NAUCLEA SESSILIFOLIA Roxb NAUCLEA SERICEA Wall</p> <p>Vern —Kum BENG Kunkoi CHAKMA Thaing MAGH Tsinhala thitpayou ၁၄ BURM</p> <p>Habitat —A small tree of Chittagong and Burma In Chittagong it is perhaps the only gregarious tree being commonly found on flat places on the banks of rivers</p> <p>Botanic Diagnosis —<i>Leaves</i> sessile oblong base cordate tip rounded glabrous <i>Heads</i> $1\frac{1}{2}$ inches diameter silky <i>Corolla</i> shaggy</p> <p>Structure of the Wood —Hard yellow brown Weight 55 lbs</p> <p>Used in Chittagong for building purposes and firewood</p> | <p>519</p> <p>TIMBER. 520 Firewood. 521 OIL 522</p> |
| <p>Adul Oil OF TRAVANCORE</p> <p>Was forwarded to the Great Exhibition of 1851 The oil is medicinal but the botanical name of the plant from which it is obtained has not as yet been discovered</p> | |
| <p>ADONIS, Linn ; Gen Pl, I, 5</p> <p>A genus of herbaceous annuals or perennials found chiefly as weeds of cultivation in the temperate regions they belong to the Natural Order RANUNCULACEÆ There are in all only some three or four species of which three are met with on the western alpine Himalaya from Kumaon to Kashmir None are found east of that region They are botanically interesting as belonging to the tribe ANEMONEÆ although they</p> | <p>523</p> |

ÆGICERAS*
majusCloth made from the tomentum of *Æchmanthera*

possess a distinct calyx and corolla the latter having 5 to 15 non nectariferous petals They are not known to be of any economic value except that they are often met with in cultivation in Europe

524

ÆCHMANTHERA, *Nees Gen Pl, II 1088*

A small genus of hairy shrubs (belonging to the Natural Order ACANTHACEÆ and the Tribe RUELLIÆ) containing in all only two species one met with on the Himalaya and the other in the Khasia Hills

Leaves broadelliptic acute crenate often viscid Clusters of *flowers* sessile scattered on the branches of the trichotomous cyme *Corolla* tubular ventricose nearly straight widened suddenly near the middle glabrous but with two hairy lines on the palate within *segments* 5 sub-equal rounded twisted to the left in bud pale violet or purplish *Stamens* 4 didynamous included longer filaments hairy *anthers* two celled *cells* mucicose *connective* excurrent at the tip or not *Ovary* densely hairy at the apex *stigma* large simple *ovules* 4-6 in each cell *Fruit* seeded to the bottom (a character which at once separates this genus from RUELLIA)

525

Æchmanthera leiosperma, *Clarke Fl Br Ind IV 429*

Habitat — Jaintia and Khasia Hills altitude 3000 feet

Mr C B Clarke in the *Flora of British India* says of this curious plant that except that the seeds are glabrous and when wetted not discoid the plant is hardly distinguishable from *Æ tomentosa*

No information regarding its economic uses

526

Æ tomentosa, *Nees var Wallichii Fl Br Ind IV 428*

Syn — *Æ WALLICHI* *Nees* *Æ GOSSYPINA* *Nees*

Vern — *Patrang ban maru* CHUMBA

Habitat — A small shrub met with in the temperate Himalaya from Kashmir to Bhutan altitude 3000 to 5000 feet

Botanic Diagnosis — *Leaves* hairy elliptic acute *petiole* $1\frac{1}{2}$ inches long *Anthers* oblong *connective* not excurrent *Seeds* densely hairy the hairs starting out when wetted

FIBRE

527

Bees

528

Fibre — In *Dr Stewart's Panjab Plants* occurs the following note regarding this plant *Madden* states that bees are particularly fond of its flowers and *Jameson* mentions that a kind of cloth is made from the tomentum of the leaf

ÆGIALITIS, *R Br Gen Pl II 624*

529

Ægialitis annulata, *R Br PLUMBAGINÆ*

Syn — *Æ ROTUNDIFOLIA* *Roxb Fl Ind Ed C B C 378* *Æ ANNULATA* *Kurz in Journ As Soc* *Æ ROTUNDIFOLIA* *Prest Bot Bermeck*

Habitat — A small evergreen treelet with pale yellow sessile flowers found in the tidal forests of the Sunderbans Chittagong Arakan Burma, and the Andaman Islands

TIMBER

530

Structure of the Wood — Very curious resembling that of the monocotyledons It consists of a soft pithy substance with scattered white pore bearing wood resembling fibro-vascular bundles but quite distinct in character

ÆGICERAS, *Gartn Gen Pl, II, 648*

531

Ægiceras majus, *Gartn, Fl Br Ind, III 533 Wight Ill, t 146*

MYRSINÆ

Vern. — *Halai khalsh* BENG *Bátayet* BURM *Kanjá* MAR *Chawír* SIND

Habitat. — A small evergreen tree met with in the coast forests and

A 531

The Bael Fruit.

ÆGLE
Marmelos.

tidal creeks of the Western Coast Bengal Burma and the Andaman Islands

Structure of the Wood—Hard close grained No annual rings
Weight 40 lbs

Used for firewood and in Jessore in the construction of native huts

TIMBER.
532

ÆGLE, *Corr* Gen Pl I 306

533

A genus (belonging to the Natural Order RUTACEÆ) comprising two or three trees inhabiting tropical Asia and Africa

Leaves alternate 3 foliolate *leaflets* membranous subcrenulate *Flowers* large white in axillary panicles *Stamens* 30 to 6 inserted round an inconspicuous disk *filaments* short sublate *anthers* elongated erect *Ovary* ovoid from a broad axis *cells* 8 to 20 peripheral *ovules* many in each cell seriate *Fruit* large globose 8 to 15 celled 6 to many seeded rind woody *Seeds* within membranous cells buried in the aromatic pulp oblong compressed *testa* woolly and mucous *cotyledons* thick fleshy *radicle* pointing away from the hilum

The name Ægle is in allusion to one of the Hesperides whose orchard bore golden fruit Marmelos is the Portuguese for quince By the medical writers this was called Marmelos de Benguala or Bengal Quince

Ægle Marmelos, *Corr* Fl Br Ind I 516 Wight Ic t 16

534

THE BAEI OF BEL FRUIT TREE THE BENGAL QUINCE

Syn—CRATÆVA MARMELOS Linn C RELIGIOSA Ainslie

Vern—*Bela* si-phal siriphal HIND *Bela bel vilva* BENG *Bil Ass* *Bela bila* BOMB *Bel MAR* *Bil Cui* *Bila kator* SIND *Siriphal bilva matura bilvaphalam balra* SANS *Safarjale hindi shul* ARAB *PFRS* *Lohagasi* KOI *Auretpang* MAGH *vilva pashum* IAM *Maredu maluramu bilrapandu pitir* TEL *Maika mahaka* GOND *Kuvalap-pasham* MAL *Corvalum belu* KURKU *Bilapatri* or *Bel patri* KAN *Okshit ushitben* BURM *Bili* SINCH

The *Bilva matura* or *matura* of the ancients Roxburgh says a small variety is called *Siriphula* in Bengal

References—Roxb *Fl Ind* *Fd* C B C 429 *Pharm Ind* 46 *Fluck & Hanb* *Pharmacog* 129 *U S Dispens* *Fd* 15th 280 *Bentl & Trim* *Med Pl* 55 *Dymock Mat Med W Ind* 112 *Moodeen Sheriff Supp Pharm Ind* 33 *U C Dutt Mat Med Hind* 129 *Stewart's Ph* *Pl* 28 *Brandis For Fl* 57 *Kurz Burm* 11 199 *Balfour's Cycl* I 33 *Official Correspondence Home Dept's Progs* 1880 286

Habitat—A tree found in cultivation all over India often curiously sending up off shoots from the roots which in time become trees Wild in Sub-Himalayan forests from the Jhelum eastward in Central and South India and in Burma

Botanic Diagnosis—A small deciduous glabrous tree with straight strong axillary spines *Leaves* pale green of three leaflets lateral leaflets sessile ovate-lanceolate 3.5 inches long terminal long petioled *Flowers* an inch in diameter greenish white sweetly scented

This tree has its nearest affinity to the elephant apple or wood apple but the imparipinnate leaves 1-celled fruit and few stamens of the latter at once remove it from the *Beli* The *Flora of British India* remarks that there is a form in Burma with oblong fruits of which no definite information exists and it is not known whether this is a distinct species or only a local variety In most bazars of India there are two kinds—the small or wild form and the large or cultivated In a correspondence with the Home Department Government of India communicated by Honorary Surgeon Moodeen Sheriff, Khan Bahadur, and forwarded by the Government of Madras, these two forms are carefully compared and contrasted

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ÆGLE
Marmelos**Gum, Dye, Medicine**

Dr Moodeen Sheriff says the cultivated form is generally free from spines

The leaflets are broadly and abruptly acuminate instead of oblong or broadly lanceolate and when bruised have an agreeable and aromatic odour fruit three or four times larger edible and very delicious when quite ripe The official part is the full grown fruit of both varieties just when it begins to ripen It is green or yellowish green externally and yellow internally The mucus contained within the cells of the fruit and around the seeds is thick very tenacious transparent and terebinthinate in smell and taste The pulp should be removed from the rind before the fruit is dry cut into small pieces and dried in the sun When dry the pulp of the small variety retains its yellowness while that of the large becomes brown or reddish brown The pulp of both has an agreeable and aromatic odour and a terebinthinate and bitterish taste The pulp of the small or common variety however is much stronger in these respects and preferable as a medicine The dried pulp is not destroyed by keeping

THE GUM

THE STFM yields a good gum occurring in tears like gum arabic or in fragmentary pieces resembling coarse brown sugar

From THE SFSDS a mucous fluid is secreted within the cells of the fruit which hardens into a transparent tasteless gummy substance **Roxburgh** who rarely overlooked any facts connected with the plants he had the opportunity of examining clearly described this substance but by modern authors it has apparently been confused with the opaque yellowish pulp **Roxburgh** says Berry large sub spherical smooth with a hard shell from 10 to 15 celled the cells contain besides the seeds a large quantity of an exceedingly tenacious transparent gluten which on drying becomes very hard but continues transparent when fresh it may be drawn out into threads of one or two yards in length and so fine as to be scarcely perceptible to the naked eye before it breaks The mucus of the seed is for some purposes a very good cement (*Roxb Fl Ind Ed C B C p 429*)

§ The seeds and the mucus are encased in a rough opaque membrane in the form of a white bean—the carpels or cells of the fruit From 10 to 15 of these bean shaped cells with the gluten and seeds inside are found in each fruit They are embedded vertically in the yellowish opaque pulp of the fruit As stated by **Dr Roxburgh** the mucus is transparent and very tenacious It has the appearance of an exceedingly pure white gum and is almost tasteless I am not aware of any use to which it is put but with lime it acts as a very good cement for mending porcelain ware (*L Liotard*)

THE DYE

A yellow dye is obtained from the rind of the fruit the unripe rind is also used along with myrabolans in calico-printing

THE MEDICINAL PROPERTIES OF BÊL

No drug has been longer and better known nor more appreciated by the inhabitants of India than *bêl* but the descriptions given by English writers are very ambiguous The unripe fruit acts as an astringent the ripe fruit taken in the fresh state is laxative but the dried ripe pulp is only mildly astringent By some authors the astringency is denied a few chemists maintain that the fruit contains tannin while others assert that this is not the case The drug used in India for diarrhoea and dysentery, is the roasted or sun dried unripe fruit cut up into slices

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from the
Stem.
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from the
Seeds
536

DYE
Rind.
537

The Bael Fruit.

ÆGLE
Marmelos

Synopsis of the parts of the plant as used medicinally

- | | |
|---|---|
| <p>(a) The UNRIPE FRUIT is cut up and sun-dried and in this form is sold in the bazars in whole or broken slices. It is regarded as astringent digestive and stomachic and is prescribed in diarrhoea and dysentery with debility of the mucous membrane often proving effectual in chronic cases after all other medicines have failed. It seems specially useful in chronic diarrhoea a simple change of the hours of meals and an alteration in the ordinary diet combined with <i>bél</i> fruit will almost universally succeed.</p> <p>(b) The RIPE FRUIT is sweet aromatic and cooling made into a morning sherbet cooled with ice it is pleasantly laxative and a good simple cure for dyspepsia and is useful in febrile affections. The dried ripe pulp is mildly astringent and may be used in dysentery. A useful popular preparation made in India is the <i>Bél</i> marmalade which may be taken like jam at the breakfast table in convalescence from chronic dysentery or diarrhoea.</p> <p>(c) The ROOT (and sometimes the STEM) BARK is made into a decoction which is used in the treatment of intermittent fever. It constitutes an ingredient in the <i>dasamul</i> or ten roots. It is given in hypochondriasis and palpitation of the heart.</p> <p>(d) The LEAVES are made into poultice used in the treatment of ophthalmia. The fresh juice is bitter and pungent and diluted with water is praised as a remedy in catarrhs and feverishness.</p> <p>(e) The ASTRINGENT RIND of the ripe fruit is employed in dyeing and tanning. It is also sometimes used medicinally. § Sections of the dried rind are sometimes used as receptacles for medicines. (<i>Assistant Surgeon Bhagwan Das Rawal Pindi</i>)</p> <p>(f) The FLOWERS are deemed fragrant by the Native physicians.</p> | <p>MEDICINE Unripe Fruit. 538</p> <p>Ripe Fruit. 539</p> <p>Root bark. 540</p> <p>Leaves 541</p> <p>Rind. 542</p> <p>Flowers. 543</p> |
|---|---|

The difference between the appearance and properties of fresh ripe fruit and of the dried slices of unripe fruit sold in the druggists shops and exported to Europe must not be overlooked. The ripe pulp is of a pale orange or flesh colour is deliciously fragrant and yields with water a pleasant orange coloured sherbet slightly laxative. The dried slices give a reddish solution acid and astringent in its action (or by some authors considered stimulant to the mucous membrane but not astringent) and not possessed of the characteristic fragrance of the ripe fruit. The dried slices are prepared from the unripe fruit before the pulp has either become flesh coloured or acquired its characteristic odour. **Dr Moodeen Sheriff** (*in the official correspondence quoted*) says it is a tonic stomachic febrifuge nauseant and a remedy in dysentery scurvy and aphthæ. It is not astringent and therefore not useful in all forms of dysentery and diarrhoea. Acute dysentery is the disease which is most benefited by it particularly in its first stage. It seems to exercise a greater influence in altering the nature of the motions than in diminishing their frequency. Its usefulness is greatly enhanced by the combination of opium (*Pulv Ipecac Co*)” (Compare with medical opinions.)

Chemical Composition.

According to **Dr Macnamara** and **Mr Pollock**, *bél* contains tannic acid a concrete volatile oil a bitter principle, and a balsamic principle resembling Balsam of Peru. Speaking of this analysis **Professor Flückiger** and **D Hanbury** in their *Pharmacographia* say they are unable to confirm the conclusions arrived at. “Nor can we explain by any chemical examination upon what constituent the alleged medicinal efficacy of bael depends. With reference to the unripe dried fruit these learned authors say The pulp moistened with cold water yields a red liquid

**EGLE
Marmelos****Opinions of Medical Officers****MEDICINE.**

containing chiefly mucilage and (probably) pectin which separates if the liquid is concentrated by evaporation. The mucilage may be precipitated by neutral acetate of lead or by alcohol but is not coloured by iodine. It may be separated by a filter into a portion truly soluble (as proved by the addition of alcohol or acetate of lead) and another comprehending the larger bulk which is only swollen like tragacanth but is far more glutinous and completely transparent.

Neither a per nor a proto salt of iron shows the infusion to contain any appreciable quantity of tannin nor is the drug in any sense possessed of astringent properties. (*Pharmacographia* Ed 1879 131)

§ A section of both the ripe and unripe fruit when moistened with a solution of ferric chloride gives a most marked tannic acid reaction strongest in those portions of the pulp nearest to the rind. **Flückiger** and **Hanbury**'s statement (quoted above) that the drug does not contain any appreciable amount of tannin and is therefore not possessed of astringent properties requires to be modified. The clear mucilage which surrounds the seeds has an acid reaction and is readily soluble in water. It gives no reaction with either ferrous or ferric salts and does not possess any astringent properties. It contains lime. (*Surgeon Warden Prof of Chemistry Calcutta*)

Official Preparations

- (1) Extract of Bel—Made from the fresh unripe fruit. Dose from half a drachm to one drachm twice or thrice daily.
- (2) Liquid extract of Bel—Prepared from the dried slices of unripe fruit. This possesses in a much less degree the properties of the extract. Dose one to two fluid drachms. Made official in *Pharmacopæia of India* in 1868.
- (3) **Dr Moodeen Sheriff** says that a powder of the dried pulp is the most convenient form of administration. It keeps well in tight bottles. Dose as a tonic 12 to 15 grains as a febrifuge and remedy for scurvy and apthæ 16 to 20 grains and as a nauseant and remedy in dysentery 20 grains to 2 drachms.

Opinions regarding the Unripe Fruit

§ The pulp of the unripe fruit is soaked in gingelly oil for a week and this oil smeared over the body before bathing to remove the peculiar burning sensation in the soles of the feet so common amongst natives. (*Surgeon Major John Lancaster M B Chittore*)

I have found this fruit very useful in catarrh and diarrhœa but of very little use in acute dysentery. I consider the taste unpleasant. (*Surgeon Major H J Haslett Ootacamund Nilgiri Hills*)

The unripe fruit in the form of decoction is very effective in cases of chronic diarrhœa, such as occur in jails where there is also probably a scorbutic element present. Its efficiency is increased by the addition of opium. I have not found it produce hæmorrhoids in any of my cases, although the drug has been continued for a long time. (*Surgeon S H Browne M D Hoshangabad Central Provinces*)

Pulp of green fruit softened by roasting and sweetened with sugar candy is useful in chronic diarrhœa and dysentery. The sharbat of ripe fruit is a pleasant cooling drink but heavy of digestion often causing acidity and heartburn. (*Assistant Surgeon Shib Chunder Bhattachary, Chanda Central Provinces*)

Very useful in chronic dysentery. In the acute form it is not so useful owing to the rapidity with which inflammatory action proceeds and grave ulceration supervenes. (*Surgeon Major C R G Parker Pallavaram Madras*) 'Most useful in diarrhœa due to general relaxed state of health

**PREPARA
TIONS
Extract
544
Liquid
Extract
545**

regarding the Bael Fruit

ÆGLE
Marmelos

MEDICINE

(more particularly in summer) (*Surgeon H D Masani Karachi Bombay*) 'Astringent in chronic dysentery and diarrhœa the unripe fruit made into decoction The ripe fruit is eaten with sugar (*Surgeon Major A F Dobson M B Bangilore*) It is also pickled and in this state is of great benefit in chronic dysentery (*Surgeon Major A S G Jayakar Muskat Arabia*) I always use this in chronic diarrhœa especially after an attack of dysentery (*Surgeon Major H D Cook Calicut Malabar*) If used for any length of time *bél* is apt to produce hæmorrhoids but this is avoided by using a little sugar along with the *bél* (*Surgeon G A Emerson Calcutti*)

The powder is more useful in acute diseases and the syrup in chronic affections In acute dysentery the powder should be administered in much larger doses than in any other disease Its first good effect is the rapid disappearance of blood and increase of the fœcullen matter in the motions It seems to have in fact more power to alter the nature of the motions than to reduce their number For the latter purpose i.e. to check the frequency of the motions it requires to be combined with some preparation of opium The powder of bael fruit is so useful in relieving the febrile symptoms in all forms of idiopathic fevers including hectic and typhoid The abnormal temperature in febrile conditions is reduced under its use in a very remarkable manner Doses of the powder as a remedy in dysentery from 20 grains to 1 drachm 4 5 or 6 times in the 24 hours and for all other purposes from 10 to 20 grains Of the syrup from 2 to 4 or 6 fluid drachms 3 or 4 times in the 24 hours (*Hony Surgeon Moodeen Sheriff Madras*)

Used as an astringent in diarrhœa and dysentery The following powder is found very efficacious in chronic diarrhœa and dysentery —

| | |
|-------------------------------------|--------------------------------|
| Bél pulp | Almond |
| Bruised mango seeds | Sugar |
| Catechu | (<i>Faswant Rai Mooltan</i>) |
| Bruised seeds of Plantago Isphagula | |

The ripe fruit when fresh is mucilaginous astringent and slightly acid I have found it useful in diarrhœa The powder or decoction of the dry fruit may be used in the place of fresh fruit (*Assistant Surgeon Bhagwan Das Rawal Pindi*)

The half ripe fruit freshly gathered is very useful in cases of obstinate diarrhœa and dysentery especially if scurvy be present Made into a powder with arrowroot it is very useful in the bowel complaint of children (*Brigade Surgeon J H Thornton B A M B Monghyr*) A liquid extract is the best way of administering this drug it is somewhat overrated It is useful in dysentery with scorbutic taint (*Surgeon G Cumberland Ross Delhi*)

I think the ripe pulp is of very little value as an astringent The unripe fruit is decidedly astringent (*Deputy Surgeon General G Bidie C I E Madras*)

I have used unripe *bél* fruit in two ways (a) entire *bél* fruit partially burnt about half or one third of each fruit to a man once a day The burning softens the pulp and makes it more digestible (b) unripe *bél* cut into slices and sun dried and boiled before eating with a little sugar In both ways it has been found to be a mild astringent stomachic and nutritive most useful in chronic dysentery and diarrhœa slowly but steadily reducing the number of motions and the quantity of mucus The ripe fruit made into a sherbet is a mild laxative and cooling drink; a little *dahi* or tamarind and sugar is added to give a subacid taste and to increase the cooling laxative property (*Surgeon D Basu Faridpur*)

Both the ripe and unripe fruits are useful in dysentery especially after

**EGLE
Marmelos****The Bael Fruit.****MEDICINE**

the acute symptoms have been checked by *ipecacuanha* " (*Surgeon Price Shahabad*)

I have used a strong decoction of the dried and sliced fruit in chronic dysentery and diarrhoea also the sherbet and pulp of the ripe fruit and the different forms of *bél* powder and preserve' (*Surgeon Pícarhy Purneah*) The unripe fruit is roasted in the fire and the pulp eaten in chronic dysentery and diarrhoea (*Surgeon Bensley Rajshahye*)

Its astringent property is due to the presence of tannic acid (*Surgeon C M Russell Sarun*) Used in chronic gonorrhoea when the pulp of a fresh fruit is mixed with milk and administered with cubeb powder Supposed to act as a diuretic and a tringent on the mucus membranes of the generative organs (*Surgeon Major J T Fitzpatrick M D Coimbatore*) The unripe fruit is half roasted in hot ashes; the whole fruit with the rind and all is beaten into a pulp mixed with a sufficient quantity of water strained and taken in large draughts with a little *palmyra* sugarcandy in cases of chronic dysentery (*Surgeon Major D R Thompson M D C I E Madras*)

The unripe fruit powdered and given in doses of gr vi and kino Co gr i with sugar gr ii in each powder to a small child suffering from chronic diarrhoea was most useful Extract has been prepared from the same by powdering mixing with water and evaporating to proper strength (*Surgeon G F Poynder Roorkee*)

The unripe fruit is used as a pickle It is also made into preserve and commonly used for cases of dysentery (*Surgeon Major Robb Ahmedabad*)

Regarding the Ripe Fruit and Sherbet — The use of ripe fruit in the form of *sherbet* is very valuable in seasons of prevalence of bowel complaints and cholera The strained pulp of the half roasted unripe fruit is more efficacious than the extracts sold by English druggists in diarrhoea and dysentery (*Surgeon R L Dutt M D Pubna*) Sherbet made from the ripe fruit is most useful in chronic dysentery and diarrhoea (*Surgeon C H Foubert Darjiling*)

The ripe fruit is an excellent laxative The sherbet should be made thick enough to be eaten with a spoon and not as many servants make it so thin that it can be drunk The quantity required to produce a laxative effect is a small tumblerful a mixture of half milk and half sherbet is an agreeable drink (*Surgeon Edw Borill Champarun*)

A very pleasant and extremely useful fruit Thick sherbet made of the ripe fruit is the best and surest laxative I know the quantity necessary to produce this effect being an ordinary tumblerful Very useful in dyspepsia and habitual constipation (*Surgeon G Price Shahabad*)

The pulp of the fresh fruit in the form of a thick sherbet is much recommended in scurvy acting at the same time as a purgative (*G W*) In subacute and chronic dysentery often invaluable taken in the form of sherbet' (*Surgeon J Matland M B Madras*)

Prescribed in diarrhoea and dysentery I have used the liquid extract very successfully as an injection in cases of gonorrhoea The ripe fruit is eaten with sugar by natives suffering from dysentery or diarrhoea. (*Surgeon W Barren Bhuj Cutch Bombay*)

Regarding the Leaves — Leaves are very efficacious when pounded into a pulp without any admixture of water and applied cold in the form of a poultice to unhealthy ulcers' (*Assistant Surgeon Anund Chunder Mukerjy, Noakhally*) The fresh juice of the leaves acts as a mild laxative in cases of fever and catarrh and has probably the effect of remedying these conditions' (*Doyal Chunder Shome Lecturer, Campbell Medical School, Sealdah*) The decoction of the leaves is used as a febrifuge and

Food, Timber, Domestic and Sacred Uses.

**ÆGLE
Marmelos.**

expectorant.' (*Assistant Surgeon Nundo Lal Ghose Bankipore*) The juice of the fresh leaves has a laxative action (*Surgeon K D Ghose Bankoora*)

Regarding the Root — The root is said by the people here to be an antidote against poisonous snake bite (*Surgeon C F W Meadows Burrisal*)

For habitual constipation root bark 1 oz boiling water 10 oz ; dose 1 to 2 oz (*Apothecary Thomas Ward Madanapalle Cuddapa*)

FOOD

The fruit when ripe is sweetish wholesome nutritious and very palatable and much esteemed and eaten by all classes The ripe fruit diluted with water forms with the addition of a small quantity of tamarind and sugar a delicious and cooling drink

**FOOD
546****TIMBER**

Structure of the Wood — Yellowish white hard with a strong aromatic scent when fresh cut no heat wood not durable readily eaten by insects Weight 40 to 50 lbs (*Brandis*) Wallich gives 49 Mr Gamble's specimens averaged 57 lbs

Used in construction for the pestles of oil and sugar mills naves and other parts of carts and for agricultural implements The wood is also valued for making charcoal but is not often used (*Stewart Pb Pl*) The wood is used in the Panch Mahals for oil mills

Dr Warth gives the following analysis of the ash composition of the wood of *Ægle Marmelos* in the *Indian Forester Vol A p 63* —

| | |
|--|------|
| Soluble potassium and sodium compounds | 0 16 |
| Phosphates of iron calcium &c | 0 13 |
| Calcium carbonate | 2 16 |
| Magnesium carbonate | 0 19 |
| Silica with sand and other impurities | 0 01 |
| Total ash | 2 65 |

**TIMBER
547****DOMESTIC USES**

Domestic and Sacred Uses — The fruit is nutritious warm cathartic in taste delicious in fragrance exquisite its aperient and detersive quality and its efficiency in removing habitual costiveness have been proved by constant experience The mucus of the seed is for some purposes a very good cement The fruit is called *Shrīphula* because it sprang say the Indian poets from the milk of *Shrī* the goddess of abundance who bestowed it on mankind at the request of *Fowarra* whence he alone wears a chaplet of *Bilva* flowers to him only the Hindus offer them and when they see any of them fallen on the ground they take them up with reverence and carry them to his temple (*Roxb in As Res Vol 2, 340 also quoted in his Flora of India*)

This is one of the most sacred of Indian trees cultivated near temples and dedicated to *Siva* whose worship cannot be completed without its leaves It is incumbent upon all Hindus to cultivate and cherish this tree and it is sacrilege to cut it down (*U C Dutt Civil Medical Officer Serampore*)

Birdwood in his *Industrial Arts of India* says it is sacred to the Trimurti being a representative of *Siva* It is also sacred to the *Parvati* and is the *Vilva rupra* one of the *Patricas* or nine forms of *Kall* It is one of the trees the planting of which by the waysides gives long life "Leaves used in enchantments" (*Irvine*)

**DOMESTIC
USES
548**

**ÆRUA
lanata.****Amarantaceae Herbs****Snuff boxes
549****Medicine
dishes
550****Orchids
551**

In Pesháwar large numbers of snuff boxes for Afghans are made from the shell of the fruit which is prettily carved over and fitted with a small bone plug for the opening in the end which serves as entrance and exit for the snuff (*Stewart Pb Pl*)

The young dry shell is also largely used for medicine dishes and bottles

ÆRIDES, Lour Gen Pl, III, 576

Ærides, a large genus of tropical orchids of which **Æ odoratum** is the most common and at the same time most handsome species growing freely and perfuming the orchid house The leaves in this genus are distichous channelled and unequally truncate but sometimes round The flowers are large and frequently scented **Æ toemale** a native of Sylhet and Mánipur has flat green rootlets closely embracing the twigs upon which it grows somewhat like a tape worm hence the specific name **Æ affine** and **Æ odontochilum** are also met with in Assam and Sylhet while in Western India occurs the spotted species **Æ maculosum** None are known to be of economic value although all are much prized as cultivated plants

ÆRUA, Forsk Gen Pl III 34

A small genus of shrubs or herbs (placed in the Natural Order AMARAN TACEÆ) comprising in all some 10 species they are inhabitants of tropical Asia and Africa

Erect or scandent closely covered with a short white tomentum *Leaves* alternate opposite or almost whorled linear oblong or obovate entire *Flowers* small or minute arranged on terminal or axillary simple or panicle spikes white or rusty hermaphrodite polygamous or dioecious with one large and two small bracts concave and persistent *Persianth* of 5 (rarely 4) short leaves oblong lanceolate acute or acuminate and very hairy *Stamens* 5 (rarely 4) *filaments* often unequal subulate united at the base into a short cup *Ovary* sub globose *style* short *stigmas* 2 or capitate *Ovary* one celled with a single ovule suspended from a long funiculus *Seed* inverted o oïd or reniform compressed *testa* thin coriaceous *arillus* wanting *albumen* farinaceous *radicle* superior

553**Ærua javanica, Juss Gen Pl III 34 Wight Ic t 876**

Syn —ACHYRANTHES INCANA Roxb *Fl Ind Ed C B C* 225 CELOSIA LANATA Linn ACHYKANTHES JAVANICA Wight's Ic t 876

Vern —Probably same as Æ LANATA

References —Voigt's Hort Calcut 317 Dals and Gibs Bomb Fl 216 DC Prod XIII Part 2 299

Habitat.—Common throughout the Peninsula and in flower all the year

Botanic Diagnosis —An erect or ascending herbaceous plant tomentose hoary *Leaves* obovate lanceolate obtuse shortly mucronate *Spikes* solitary sessile ascending *Calyx* a little longer than the acuminate one nerved bracts

554**Æ lanata, Juss Gen Pl III 34 (Wight Ic t 723^p)**

Syn —ACHYRANTHES LANATA Roxb *Fl Ind Ed C B C* 227

Vern —Chaya BENG Bhu: RAJ Bui jari SIND Bui kallañ (flowers as sold in bazars) PB Kul ke jar khul DUK Asmeri spirkhe sassadi TRANS INDUS Kapur-madhura MAR Sirru-pulay dayr TAM Pandi-conda TEL Astmabayda SANS

References —DC Prod XIII Part 2 303 Dymock Mat Med W Ind 540 Murray's Pl and Drugs Sind 101

Habitat —Small herbaceous weeds common everywhere in the plains, ascending to 3 000 feet in altitude from the Indus eastward to Bengal and Burma and southward to the Madras Presidency

Botanic Diagnosis —A small herbaceous plant ash coloured and a

A. 554

The Sola Plant.

**ÆSCHYNOMENE
aspera**

little tomentose *Leaves* ovate obtuse shortly mucronate pubescent on both sides *Spikes* solitary or in twos or threes sessile horizontal *Calyx* twice as long as the bracts

Properties and Uses—

Medicine—The flowering tops are officinal and the roots are used in the treatment of headache and by the natives of the Malabar coast are regarded as demulcent The flowers are sweetly scented (*Graham Murray &c*)

§ I am not aware of its being used medicinally in South India (*Deputy Surgeon General G Bidie C I E Madras*)

In Sind *Stewart* says the woolly spikes are used for stuffing pillows rats are fond of the seed The stems are often covered with woody galls

Ærua scandens, Wall DC Prod XIII pt 2 302

Syn—ACHYRANTHES SCANDENS Roxb Fl Ind Ed C B C 227 Gamble's Trees and Shrubs Darj 63

Vern—Nuriya BENG

Habitat—A large climber covering the tallest tree with its masses of handsome flowers and soft whitish leaves common in the lower hills ascending to 6000 feet Monghyr the Feraï Kumaon &c

Botanic Diagnosis—Stem sub fruticose climbing *Leaves* elliptic oblong acuminate at both ends mucronulate pubescent, green

ÆSCHYNOMENE, Linn Gen Pl I 515

A genus of herbs or shrubs (belonging to the Natural Order LEGUMINOSÆ) comprising some 3 species distributed throughout the tropics

Leaves odd pinnate with numerous sensitive leaflets *Flowers* in sparse racemes *Calyx* deeply two lipped the lips 4 to 6 *Corolla* early caducous standard orbicular keel not beaked *Stamens* in two equal bundles *Ovary* stalked linear many-ovuled *style* filiform incurved *stigma* terminal *Pod* with a stalk longer than the calyx composed of 4-8 joints each one seeded

The name *Æschynomene* is derived from αἰσχυνομαι to be ashamed It was given to a sensitive plant (the *Mimosa*) mentioned by Pliny probably in allusion to its closing so readily on being touched The genus to which the name is now applied belongs to the Sub-Order PAPILIONACEÆ not to the MIMOSÆ There are two Indian species

Æschynomene aspera, Linn Fl Br Ind II 152 Wight, Ic, t 299

Syn—HEDYSARUM LAGENARIUM Roxb Fl Ind Ed C B C

Vern—Sola or shola phul shola BENG Kihl ASS Bhend MAR Atunete takke TAM Nirj lusa bend IEL Paukpan paukbyu BURM

Habitat—A small sub floating bush frequenting marshes and growing mostly during the season of inundation in Bengal Assam Sylhet Burma and South India

Botanic Diagnosis—Stems robust swollen (often 2 inches in diameter) full of white light pith with a central channel and a thin yellowish grey bark not more than $\frac{1}{4}$ inch in thickness simple rarely if ever branched erect Peduncles calyx and large corolla hispid

Properties and Uses—

Fibre—In Burma a fibre is obtained from the thin bark

Domestic Uses—The so called pith or sola however is the most valuable product of the plant it is largely used by fishermen for floats it is cleverly cut up into paper like sheets and made into temporary decorations for idols during certain festivities Europeans use it for making hats

MEDICINE
Flowering
tops

555

Roots

556

DOMESTIC

USES

Woolly spikes

557

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FIBRE.

561

DOMESTIC

USES

Floats

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ÆSCULUS
indica**The Indian Horse-chestnut**Hats
563
Toys
564

(*sola topis*) which while being perfect protectors from the sun are extremely light The pith models of bullock carts and other articles of Indian interest made chiefly at Tanjore in Madras are both curious and artistic Sola is also made into a multitude of highly coloured toys

§ A common weed in tanks The soft and spongy pith is used as a substitute for sponge for the preparation of surgical lints which are used for widening the narrow openings of sinuses and abscesses and also for dilating the rigid os uteri If a piece of the pith about an inch long and shaped like a cone with a sharp knife be pressed between the fingers it becomes very thin and if inserted into the narrow opening of an abscess or sinus it absorbs the moisture and swells up to its original size and thus enlarges the opening without cutting (*Hony Surgeon Moodeen Sheriff Khan Bahadur Madras*) The pith of the stem can be used as a substitute for corks in medicine bottles (*Brigade Surgeon G A Watson Allahabad*)

Æschynomene cannabina, Retz

Syn for *Sesbania aculeata*, Pers var *cannabina*, which see

Æ grandiflora, Linn

Syn for *Sesbania grandiflora*, Pers which see

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Æ indica, Linn Fl Br Ind, II 151 Wight Ic, t 405

Syn — HEDYSARUM NELI TALİ Roxb Fl Ind Ed C B C SMITHIA
ASPERA Roxb Fl Ind Ed C B C Æ KASHMIRIANA Camb NELI
TALI Rheed Mal IX t 18
Vern — *Tiga juluga* TEL

Habitat — From the plains of Bengal to the lower hills ascending in Kashmir to 5 000 feet and to 4 000 in Kumaon Distributed to Ceylon Siam Japan

Botanic Diagnosis — Stems slender much branched *Peduncles* viscid *calyx* small *corolla* glabrous

Apparently not put to any economic purpose

Æ Sesban, Linn

Syn for *Sesbania ægyptiaca*, Pers which see.

566

ÆSCULUS, Linn Gen Pl I, 398

A genus of trees (belonging to the Natural Order SAPINDACEÆ) comprising in all only 14 species natives of the temperate parts of Asia and America

Leaves exstipulate opposite digitate deciduous *Panicles* terminal thyrsoid *Flowers* large polygamous irregular *Sepals* and *petals* 4 5 unequal *Disk* annular or unilateral lobed or entire *Ovary* sessile 3 celled *Style* elongated *stigma* simple *ovules* 2 in each cell superposed *Fruit* capsular 1 3 celled *valves* loculicidal coriaceous *cells* 1-seeded *Seeds* exalbuminous with a broad *hilum* *testa* coriaceous *cotyledons* thick corrugated conferruminated

The generic name is derived from the Latin word *Æsculus* given by Virgil and Horace to a tree believed to have been a species of Oak

567

Æsculus indica, Colebr Fl Br Ind, I, 675 Bot Mag t 5117**THE INDIAN HORSE CHESTNUT**

Vern. — *Torjaga* TRANS INDUS; *Háne hanudán* KASHMIR *Gán hanor* PB; *Kishang* N E KUMAUN *Bankhor gugu hanor pankar* HIND

Habitat. — A large tree 60 to 70 feet in height deciduous found most abundantly in the North West Hmálaya, extending from the Indus to

Horse-chestnut.

**ÆSCULUS
Hippocastanum.**

Nepal between 4,000 and 10,000 feet in altitude. It grows on any soil, and produces annually an abundant crop of nuts and elegant foliage.

Botanic Diagnosis—*Leaflets* 7 acuminate and minutely serrate distinctly petioled. *Panicles* oblong nearly equalling or exceeding the leaves. *Flowers* secund. *Petals* 4 red and yellow the place of the fifth vacant. *Capsule* ovoid reddish brown without spines rough. *Seeds* dark. The bark peels off in long vertical strips giving old trees a scaly appearance.

Properties and Uses—

Fodder—The fruits are in the Himálaya eaten greedily by cattle and in times of scarcity by men after being steeped in water and sometimes mixed with flour. The leaves are lopped for cattle fodder.

Medicine—The fruit is given to horses during colic. It is also applied externally in rheumatism but for this purpose the oil is generally extracted from the seed.

Structure of the Wood—White with a pinkish tinge soft close grained. Weight 34 lbs per cubic foot.

It is used for building water troughs platters packing-cases and tea boxes it is easily worked.

Domestic Uses—Thibetan drinking cups are sometimes made of it.

CULTIVATION—The *Indian Forester* February 1884 page 57 gives a useful and practical note regarding the rearing of this tree. It recommends that the seed should be collected in November or December and sown in good rich soil in drills. In the following cold weather when the young trees shed their leaves they should be transplanted into lines each seedling 18 inches apart. If kept free from weeds by the following cold season they will be ready for re transplantation into the forest.

Æsculus Hippocastanum, Linn Fl Br Ind, I 675

THE HORSE-CHESTNUT

Vern—*Pu* *Pb* *HIM NAME (Brandis)*

Habitat—A well known tree in Great Britain and in Europe generally. Is supposed to have been introduced most probably from Asia. It is found in Persia and the Caucasian region in India only in a state of cultivation. The home of the common horse-chestnut is at present unknown.

Botanic Diagnosis—*Leaflets* 7 digitate the larger ones woolly when young bi serrate and with prominent lateral nerves. *Capsule* echinate.

As an ornamental tree for parks pleasure grounds road sides and avenues in temperate countries this is justly a great favourite. The avenue in Bushy Park London planted by William III affords a fine example of the adaptability of the horse-chestnut for ornamental purposes (*Smith's Dictionary*). It is not particular as to soil.

Dye—An extract from the wood is said to be used in imparting to silk a black dye.

Food—The nuts are variously utilised. In Turkey they are ground with other food and given to horses hence the name. In France they are employed in the manufacture of starch. In Ireland they are macerated in water and being saponaceous are used to whiten linen.

Medicine—The fruit and bark have for long been regarded as useful in the treatment of fevers as an antiperiodic. Esculine in doses of 15 grains is said to have been found most useful in malarial disorders.

Chemical Composition—The bitter principle of the fruit has been termed *esculin* and may be obtained by precipitation with acetate of lead. It forms shining white prismatic crystals inodorous bitter slightly soluble in cold water. Its formula according to Schiff is $C_{24}H_{16}O_8$. When treated with dilute sulphuric acid it is converted into grape-sugar. Tannin is also found in all parts the leaves and bark more especially.

FOOD
Fruits.

568

FODDER

569

MEDICINE.

The Oil

570

TIMBER

571

DOMESTIC

USES

Cups.

572

573

DYE

574

FOOD

Nuts

575

MEDICINE.

576

A 576

AGANOSMA
calycina**Eagle-wood**

577

Æsculus punduana, Wall *Fl Br Ind*, I, 675**Syn.**—*Æ ASSAMICA* Griff (*Kurz* 286)**Vern.**—*Cherinangri* NEPAL *Kunkirkola ekuhea* Ass *Dingri* DUARS
Bolnawak GARO**Habitat.**—A moderate sized deciduous tree found in Northern Bengal in the Khásia Hills Assam and Burma ascending to 4 000 feet**Botanic Diagnosis.**—*Leaflets* 5-7 shortly petioled *Panicles* narrowly lanceolate nearly equalling the leaves lower pedicels longer *Petals* white and yellow

TIMBER

578

Structure of the Wood.—White soft close grained Weight 36 lbs per cubic foot Rarely used

579

AFZELIA, Sm *Gen Pl II* 580A small genus of erect unarmed trees (belonging to the LEGUMINOSÆ) comprising only 10 species distributed throughout the tropics of the Old World *Leaves* abruptly pinnate with few pairs of opposite leaflets *Disk* at the top of a long calyx tube *Sepals* 4 unequal only one petal developed the others absent or rudimentary *Stamens* 3-8 free *filaments* long pilose *Pod* large oblong flat

There are four Indian species—all however confined to the Straits and the Andaman Islands

580

Afzelia bijuga, A Gray *Fl Br Ind II* 274**Vern.**—*Shoondul kunga* BENG *Pynkado* BURM IN THE ANDAMANS
Pirijda dsagunda AND**Habitat.**—A moderate sized evergreen tree found in the Sunderbans Bengal Andaman Islands and the Malay Archipelago

TIMBER

581

Structure of the Wood.—Sapwood white moderately hard relatively large in young trees Heartwood reddish brown hard close grained Weight young wood 36 to 42 lbs old wood 45 to 49 lbs (*Brandis Memorandum on Andaman Woods* 1874 Nos 12 and 13 gives 50 lbs)

A valuable wood used in the Andamans for bridges and house building It is however very little known in India

Agallocha, see *Aquilaria Agallocha*, Roxb THYMELÆACE

THE EAGLE WOOD, ALOES WOOD, CALAMBAC WOOD, AGILA, AKYAW

Agallocha, see also *Excæcaria Agallocha*, Willd

582

AGANOSMA, G Don *Fl Br Ind III* 663 *Gen Pl II*, 717,
reduces this genus to Ichnocarpus

A genus of APOCYNACEÆ belonging to the sub tribe FUECHITIDEÆ comprising some 5 species confined to India and the Malaya Nearly allied to ICHNOCARPUS the aestivation of the corolla separating them

Flowers in terminal tomentose cymes large or middle sized *Sepals* narrow lanceolate acuminate with subulate glands at the base *Corolla* salver-shaped tube short throat naked except with longitudinal bands behind the anthers lobes lanceolate to linear oblong or broad and rounded in bud overlapping to the right and then straight *Stamens* included *anthers* sagitate conniving over the stigma and adnate to it *cells* spurred at the base *Disk* 5-lobed *Carpels* 2 distinct hirsute many-ovuled *Follicles* short or long terete straight or curved linear *Seeds* ovate linear oblong flattened glabrous not beaked

583

Aganosma calycina, A DC, *Fl Br Ind III*, 664**Syn.**—*ECHITES CARYOPHYLLATA* Roxb *E CALYCINA* Wall A ROXBURGHII, G Don ex Wight *loc. cit* 440**Habitat.**—An evergreen scandent shrub, met with in the forests of Tenasserim, flowering in September

A. 583

Mālatī Medicine.

AGARICUS

Botanic Diagnosis—*Leaves* elliptic oblong acuminate glabrous 7 to 10 pairs of arching slender impressed nerves *Cymes* terminal, lax flowered densely rusty tomentose *Sepals* $\frac{1}{2}$ -1 inch long eglandular *Petals* ovate acute *Ovary* quite glabrous

Aganosma caryophyllata, *G Don Fl Br Ind III, 664*

584

Syn—ECHITES CARYOPHYLLATA *Wall non Roxb*

Vern—Mālatī HIND BENG and SANS **Voigt** gives *Gandhomulati* as the Bengali name

Habitat—Lower Bengal (Monghyr *Hamilton*) common on rocks at Risikund (*Wallich*) Deccan Peninsula (*Heyne*) &c

Botanic Diagnosis—*Leaves* ovate-acute obtuse or acuminate glabrous or tomentose nerves red coloured 3 pairs very oblique *Cymes* lax flowered pubescent *pedicels* shorter than the sepals *sepals* glandular within *Corolla lobes* obliquely orbicular *Ovary* hairy at the tip

Properties and Uses—

Medicine—The only mention I find of *Aganosma* being medicinal is in *U C Dutt's Materia Medica* where it occurs in his Glossary of Indian medicinal plants mentioned by Sanskrit writers He does not give its supposed properties but states that the vernacular name for *A caryophyllata*, *G Don* is *Malati* whereas all other writers give that as the vernacular name of *A calycina*, *DC* It seems therefore that the plant has not been carefully identified by the author of the *Hindu Materia Medica*

§ According to Sanskrit authors this plant is heating and tonic useful in diseases caused by disordered bile and blood (*U C Dutt Civil Medical Officer Serampore*)

MEDICINE
585

A cymosa, *G Don Fl Br Ind III 665*

586

Habitat—A stout rambling climber met with in Sylhet and also in the Western Peninsula from Bombay to Travancore

Botanic Diagnosis—*Leaves* acute or finely acuminate *Cymes* dense flowered rounded densely tomentose *Sepals* $\frac{1}{2}$ $\frac{1}{2}$ inch long *Corolla tube* $\frac{1}{2}$ $\frac{1}{2}$ inch *petals* ovate acuminate

A. marginata, *G Don Fl Br Ind III 663*

587

Habitat—A large evergreen scandent bush met with in Sylhet Chittagong Tenasserim Malacca and distributed to Java Sumatra and the Philippine Islands

Botanic Diagnosis—*Leaves* oblong acute acuminate or caudate nerves very strong beneath accurately uniting towards the margin *Cymes* lax *Corolla* glabrous tube rather longer than the acute calyx segments *lobes* linear obtuse

Structure of the Wood—Light coarsely fibrous close-grained soft and pale coloured (*Kurz*)

TIMBER
588

Agar-agar or **Ceylon Moss**, see *Gracilaria lichenoides*, *Greville*
LICHENES

AGARICUS, *Linn Syst Nat 1735*

589

A large and important genus of FUNGI referred to five series, each containing a number of sub-genera *Spores* of various colours. *Gills* membranaceous, persistent with an acute edge *Trama* (the layer of tissue which separates the gills at their union to the pileus) floccose confluent with the inferior hymenium *Fleshy fungi* which on being dried putrefy and cannot again be revived.

Series I—*Leucospori*—Spores white

Series II—*Hyporhodii*—Spores pink

K

A. 589

**AGARICUS
campestris.****The Mushroom.**

Series III —Dermini—Spores brown

Series IV —Pratellæ—Spores purple

Series V —Coprinari—Spores black

Each of these is again sub-divided into—

* Hymenophore distinct from the fleshy stem

** Hymenophore confluent and homogenous with the fleshy stem

*** Hymenophore confluent with but heterogenous from the cartilaginous stem

More than 1 000 species are known and referred to AGARICUS, the typical genus of the Order (Cooke *Hand Book Br Fungi*)

590

Agaricus campestris, Linn**THE MUSHROOM**

Vern—*Kat phula* ASS *Alombe kalambe* BOMB *Mánshkel* KASHMIR;
Moksha CHAMBA *Kuti leubha khumha* SIND *Kagdana chhatra*
GUJ *Chattrak* SANS *Khumbah khámbar chattri* AFG *BAZAR*
NAMES *Ot SANTH* *Kámh samarogh* (Stewart) *Herar* POISONOUS
forms *Kullahic-dw* (Fairies cap) also *chatra mar* (Snake's umbrella)
and *samarugh* PERS

Habitat.—There are in India several species of fungi eaten indiscriminately but as these have not as yet been botanically determined it is preferable to refer to all under the common name which in English they would doubtless receive *vis* The Mushroom

Botanic Diagnosis—*Pileus* fleshy convexoplane dry silky floccose or squamose stem stuffed even white *ring* medial somewhat torn *gills* free approximate ventricose sub-deliquescent, flesh coloured thin brown (Cooke) This species belongs to the series PRATELLÆ and the sub-genus PSALLIOTA

Chemical Composition—Interesting information regarding the chemistry of certain species of AGARICUS will be found in the *Year Book of Pharmacy* 1877 p 142 1881 p 147

§ 'Dr N Ohevers in his work on *Indian Medical Jurisprudence* refers to a case in which symptoms closely resembling those of intoxication rapidly ensued after eating mushrooms and the author therefore considers it probable that there exists in Bengal a fungus which closely resembles an edible variety in form and colour but which contains *amanitine* or *muscarine* the poisonous principle of the *Amanita Muscaria*. *Amanitine* is stated also to exist in *A bulbosus* and *A volucaeus* This principle sometimes acts as an irritant at other times as a narcotic or narcotous acrid and the symptoms may be developed within a few minutes or not for several hours Muscarine is described as being soluble in water and appears to be a somewhat stable compound Its action upon the system is opposite to that of atropine (*Your Ph Soc*) The *A. Muscarius* or fly mushroom is in England most frequently found in fir or beech woods It has a rich vermilion pileus studded with white or slightly yellowish warts white gills and tall white stem swollen at the base into a bulb and furnished with a ring a short distance below the pileus This fungus is used in Siberia as an intoxicating agent and one or two suffice to produce pleasant intoxication for a whole day (*Spons Encycl*) Some persons through idiosyncrasy are injuriously affected by ordinary edible varieties the effects being usually confined to colic purging and vomiting (*Parg*) Edible mushrooms contain a non saponifiable, buttery fat Agaricin (*Lefort*) The recent researches of Dupetit indicate that all edible mushrooms contain a poisonous principle which resembles the soluble ferments and not the known alkaloids The poisonous principle is destroyed at a temperature of 100° C, and the mushrooms rendered innocuous This author has also obtained two alkaloids from edible mushrooms (*Surgeon C F H Warden, Professor of Chemistry, Medical College, Calcutta.*)

Fungi.

AGARICUS
campestris.*Properties and Uses—*

Food—In many parts of India especially in the Panjáb, the true Mushroom is abundant in fields. It is universally eaten by the natives, fresh or dried in the sun. It is apparently a very common plant in Afghanistan. Aitchison mentions *A Mitto*, Pers as met with in Kárum district. He also mentions *Morchella esculenta*, *Helvella crispa*, and *Hydnum coralloides* as eaten by the Afghans, the last mentioned being collected in August and sun dried.

The common mushroom says Dr Stewart is abundant in cattle fields in many parts of the central Panjáb after the rains, and is also frequent in the desert tracts of central and southern Panjáb. It is largely eaten by the natives and is described as excellent and equal to the English mushroom by those Europeans who have eaten it. It is also extensively dried for future consumption and is said to preserve its flavour tolerably well. Mushrooms are largely used in Europe in the manufacture of ketchup. A trade in Panjab mushrooms might easily be established were they to be improved in quality by cultivation.

It may not be out of place to mention here a few of the characters by which a wholesome fungus may be recognised—

1st—Wholesome fungi are found growing in fields or in open grassy places in forests.

2nd—They are scattered each rising direct from the ground; never collected into clumps nor found growing upon trees.

3rd—The stem should break easily when touched; it should spring from the centre of the pileus. The cap should be thick relatively to the gills.

4th—They should not be acid in flavour nor smell. No fungus is so poisonous but that this test may be put into force, but it does not follow an acid fungus will be poisonous. Indeed *Hydnum repandum* and *Cantharellus cibarius* are both acid yet are excellent articles of food. A hot burning taste or acid flavour should however as a rule be avoided.

5th—The bright rosy or pink gills and the absence of any yellow stain when bruised are two good tests.

The natives of India seem to eat any fungus and indeed if properly cooked, few are dangerously poisonous. If macerated in vinegar before being cooked and if eaten with plenty of bread there is almost no danger. It is a good practice with any acid or doubtful mushroom to slice it into hot water and then to press the slices in a cloth before stewing. The Russians preserve mushrooms in salt but this is far from destroying their poisonous property. witness the death of the wife of the Czar Alexis I from eating mushrooms in Lent. The narcotic poison in certain fungi resembles in its action Indian Hemp. No antidote has as yet been discovered for this poison.

Medicine—The small dried mushrooms are officinal in the Panjáb and are sold as *Moksha* being regarded as alterative.

§ The cultivation of several indigenous varieties of mushroom is of importance for supplying an excellent nutritive food for European convalescents. There are many valuable varieties procurable in the plains of India. Even Truffles—white and black—I have seen in abundance at Bankura. In taste and flavour they are not inferior to the French plant. They grow under the soil below Sal trees and are dug out by the Santals. (Surgeon Major R. L. Dutt, M.D., Pubna.)

Common in South India and used by the natives. (Deputy Surgeon General G. Bidie Madras.)

The following species are also mentioned by Indian writers on Economic

FOOD

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MEDICINE.

595

**AGARICUS
igniarius****The Garikūn.**

596

Agaricus igniarius and **A albus** are referred to by Dr Stewart in his *Panjab Plants* **Polyporus igniarius** by Dr Irvine, and **P officinalis** by Dr Dymock

Vern —*Bulgar jangli* KASHMIR *Buti ka mochka* CHENAB *Kiain* PB
Gharikun a BAZAR NAME

MEDICINE
597

Medicine—Stewart remarks This appears to come from the west about 15 seers being annually imported *via* Peshawar It is official being given for internal disorders The tinder or ashes are also said by Honigberger to be used to stop hæmorrhage Dr Irvine in his *Short Account of the Native Materia Indica of Patna* describes what in all probability is the same as the above species under the name of **Polyporus igniarius** He gives it the HINDI name *garigond* and the ARAB *Agarikun* and describes the drug as used as a styptic externally and internally as a bitter tonic and laxative He gives the dose as one to five grains and says that it fetches the extraordinary price of Rs 26 a lb This is most probably the same plant as Dr Dymock describes under the name of **Polyporus officinalis** the *Garikun* of Bombay which he says is largely imported from the Red Sea and the Persian Gulf ports into Bombay and is much used by hakims

This is the *Agaricon* of **Dioscorides** and the white *Agaric* of European medicine It is commonly kept by native druggists being an important article in the *Materia Medica* of the Mohammedans who prescribe it in a great number of disorders but generally in combination with other drugs According to their hakims it acts principally by expelling cold and bilious humors (*Surgeon Major Dymock Mat Med W Ind 702*)

Hanbury in his *Science Papers* p 184 speaking of what appears to be the same as the above fungus says During the Middle Ages it was exported from Asia Minor and in the Paris Exhibition specimens from this region—that is to say from the Gulf of Adalia—were exhibited What is the tree from which this Asiatic *Agaric* is obtained? It is found upon the larch in Northern Russia

§ *Garikun* acts as a purgative and is used in disorders of the liver and kidneys Diuretic and emmenagogue properties have also been assigned to it It has been employed with benefit in cases of gravel in the bladder It is used as a gargle in affections of the throat gums and teeth In combination with liquorice it is employed in chronic bronchitis and asthma and with syrup of vinegar in jaundice and enlargement of the spleen It is said to be of much repute as a safeguard against scorpion bites In large doses it acts as a poison *Fund i bedastur* is said to be its antidote (*Asst Surgeon Gholam Nabi*)

A albus furnishes a principle *agaricin* which was formerly renowned as a specific for lessening the night sweats of phthisis It is again coming largely into use (*Surgeon Major E G Russell Calcutta*) It is diuretic laxative and expectorant In very small doses it is a nervine tonic (*Assistant Surgeon F N Dey Feypore*) A large fungus is imported as a medicine from Central Asia to Leh and Kashmir and is called *Gari kun* (*Surgeon Major F E T Atchison Simla*)

From the conflicting opinions received from most parts of India, it seems that a number of widely different species of fungi are imported

A 597

American Aloe Fibre

AGAVE

into and sold in India as *Gari kun*. Until this subject can be thoroughly and scientifically investigated it has been thought advisable to publish in one place all notices regarding *gari kun*. It seems probable that most of the forms of *gari kun* belong to the Polyporus group of fungi and not to *Agaricus*. For further particulars regarding other Indian fungi see *Polyporus*, *Morchella*, &c.

Agaricus ostreatus, Jacq

598

Vern—*Phanasa alambe* or vulgarly *phansamba* CUTCH BOMB

' This is a dark snuff coloured fungus which grows upon the stumps of old jack trees (*Phanas*). It consists of a short thick stalk which supports a flat woody pileus having a considerable resemblance to an oyster shell and consisting of a number of laminae upon the under surface of which is situated the hymenium.

Medicine—*Phanas alambe* is ground to a paste with water and applied to the gums in cases of excessive salivation. It appears to have much the same properties as *Amadou* and to be a useful styptic (*Surgeon Major Dymock Mat Med W Ind 704*).

§ Useful in stomatitis (*Surgeon W Barren Bhuj Cutch, Bombay*)

Food—The species is edible

MEDICINE
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FOOD
600

Agathotes Chirata, D Don see *Swertia Chirata, Ham* GENTIANACEÆ

THE CHIRETTA

AGATI, Desv Gen Pl I 502

601

A generic name formerly applied to one or two species of plant now reduced to the section AGATI under the genus *SESBANIA* (Natural Order LEGUMINOSÆ). They differ from the type of the other *SESBANIAE* chiefly in having larger flowers with the flower bud falcately recurved.

Agati grandiflora, Desv or *Æschynomene grandiflora, Linn Roxb*
Coronilla grandiflora, Willd see *Sesbania grandiflora, Pers* LEGU
MINOSÆ

AGAVE, Linn Gen Pl III 738

602

The name of a large and important genus belonging to the Natural Order AMARYLLIDÆ. There are several species all originally natives of Central America and chiefly of Mexico. They are now however widely acclimatised in most warm temperate or sub tropical and tropical countries—in Spain Italy Africa Western Asia and India. They are first mentioned in Europe in 1561 and are supposed to have been introduced into India by the Portuguese. They are commonly but erroneously called American Aloes. From the Aloe proper they are botanically separated by the position of the ovary which is inferior in the Agave but superior in the Aloe. Like the Aloes however they consist of a crowded whorl of thick fleshy leaves more or less spirally arranged on the top of a short stem which in the majority of species rarely rises much above the level of the ground. Along the margins are arranged sharp prickles and each leaf ends in a formidable apex long sharp and spear like. In most species so closely do the leaves in the bud embrace each other that each impresses its outline upon the fleshy substance of the other forming a graceful variation on the otherwise smooth glaucous surface. In cultivation several species become variegated in colour the most striking being one with golden bands along the leaves. They take several years to reach the flowering stage and from the fact that in adverse circumstances their development may be retarded from 10 to 50 or even 100 years, they are popularly called the Century Plants. When about to

A. 602

**AGAVE
americana****The Century Plant or American Aloe.**

flower, an axis is developed from the centre of the rosette of leaves and rising at the rate of from 5 to 10 inches a day it often attains the height of 20 30 or even 40 feet Thereafter it produces its flowers from sub divisions and continues to do so for over a month After flowering and seeding the plant dies but from the ground daughter off shoots spring up and thus a hedgerow of Agave continues to flower year after year

Generic Diagnosis—*Leaves* thick fleshy toothed and spiny crowded on the apex of a short erect succulent stem *Scape* rising from the centre of the leaves erect often becoming very high and rapidly developed, branching towards the upper third into an immense thrysiform panicle *Flowers* fasciated on the branches of the panicle greenish white erect *Perianth tube* often very short split into 6 sub equal lobes *Stamens* longer than the perianth upon which they are inserted *filaments* tapering above flattened below *Ovary* inferior globose ovoid often fleshy 3-celled *ovules* numerous on the central angle on each cell and 2 seriate; *style* filiform at the base 3-celled like the ovary

The genus *Fourcroya* is so nearly allied to that of *Agave* that the various species are popularly viewed as mere varieties of *A americana*. All that can be said regarding the fibre of the species of *Agave* is equally applicable to the fibres from the species of *Fourcroya*. Indeed the reports of Aloe fibre cultivation are uniformly written in what may be briefly described as commercial language and it is quite impossible to discover whether the good or bad varieties mentioned by writers on the subject are different species of *Agave* or even of *Fourcroya* or merely all local and accidental varieties of *A americana*. It has been repeatedly observed that aloe fibre plants change their character when taken from one country to another and at the present moment it is next to impossible to arrive at any definite knowledge regarding the species and varieties cultivated for their fibre. The foregoing diagnostic characters of *Agave* if compared with *Fourcroya* should help however to remove ambiguity regarding the forms of the so-called American Aloe fibre. An important step would be taken were the fibre yielding plants to be carefully referred to their respective genera. The account of *A americana* in the succeeding pages should be viewed more as aloe fibre plant since it seems probable that the name *A americana* is popularly given to a series of species and varieties yielding allied fibres.

The generic name is derived from the Gr *ἀγανός* illustrious or admirable in allusion to the stately form of the flowering stem

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Agave americana, Linn AMARYLLIDÆ

THE CENTURY PLANT THE AMERICAN ALOE THE CARATA Eng
PITA OF MAGUEY Sp

Vern—*Rakas-pattah* bansheora bara kanwar kantala hathi sengar
ram kantā HIND *Yungli* or *bilati* ananash vulgarly (anaras) bansheora
bilatipāt hoyan, incorrectly called *murga murji* BENG *Wilyati*
kaitalu PB *Kantala* SANS *Seubbāra* ARAB *Parkānd* MAR
Rakas patia DUK *Yangli kunvara* GUJ *Anak kat rashar*, *pitha*
kalabunsha TAM *Rakāshmatālu* TEL *Panam katrāsha* MAL
Bhuttale budukattalenaru KAN *Kitgi* HYDERABAD (a name applied
in other parts of India to *Pandanus*)

References—*Roxb Fl Ind Ed C B C* 296 *Royle Fib Pl* 41 50
Christy New Com Pl 45 47 *Drury Us Pl* 21 *Lindley and Moore s*
Treasury of Botany Smith s Dict Econ Pl Spons Encycl Official
Correspondence

Habitat.—Originally a native of America naturalised in many parts of India. While plentiful throughout the country, the *Agave* nowhere occurs gregariously. In the Madras Presidency several varieties are extensively

American Aloe Gum.

AGAVE
americana.

used for hedges to protect the railways, and in many of the hotter portions of Central India they grow where scarcely anything else grows, and, as hedges, serve the valuable purpose of checking the translation of sand and surface soil by the hot winds which for some months sweep across the dry arid tracts. As has been remarked they stand isolated in the midst of dreary solitude and impart to the tropical landscape a peculiarly melancholy character. It is one of the most remarkable features of the Agave that, while thus luxuriating under warm tropical influences it is equally at home on the hills under widely different climatic conditions. This strikes the traveller forcibly when after hurrying across the tropical plains of Madras, with their interminable hedges of Agave and Cactus he finds on the hills amid a temperate vegetation equally luxuriant hedgerows of Agave.

If planted at regular distances with a ditch on one side so as to carry off the excess of moisture the plant will thrive under the greatest variations of temperature ascending in India to the altitude of the tea plantation where it is largely employed as a hedge.

Synopsis of the Properties and Uses of Agave.

The LEAVES and the ROOTS yield an excellent fibre generally known as Pita American Aloe Fibre or Vegetable Silk. The word Pita is by some authors restricted to a form which appears to be a variety of this species. The large moist fleshy leaves are sometimes used as a poultice. They are occasionally used as fodder.

The ROOTS are diuretic and antisyphilitic and are said to find their way to Europe mixed with Sarsaparilla. Prescott in his *History of Mexico* says that when properly cooked the root affords a palatable and nutritious food.

The SAP —If the central bud be lopped off at the flowering season the cut stem discharges freely a sour liquid which ferments rapidly and forms the Pulque Beer of the Spaniards or by distillation a kind of brandy known as Mexical.

The EXPRESSED JUICE of the leaves is administered by American doctors as a resolvent and alterative especially in syphilis. It may also be used as a substitute for soap.

The FLOWERING STEM dried and cut into slices may be used as natural razor strops or as a substitute for cork. Wall plaster impregnated with the expressed juice is said to be proof against the ravages of white ants.

THE GUM

It is stated that in America a gum exudes from the leaves which in some respects resembles gum arabic. It contains a much larger proportion of lime and is only partially soluble in water. The soluble portion resembles gum arabic and the insoluble gum bassora (*U S Dispens 15th Ed*). The exudation of gum has apparently not been observed in India.

GUM.
604

THE SAP AND JUICE

The Sap and the Spirit —In their *Treasury of Botany* Lindley and Moore state that the most important product of the Agave and especially of *A americana*, is the sap and that many varieties of this species are common everywhere in equinoctial America from the plains even up to elevations of 9,000 or 10,000 feet. The sap is further stated to have given a net revenue of £166,497 from three cities.

In the *Pharm Journal 3rd series*, V, 461 occurs an interesting article upon Agave by Mr J R Jackson, an abstract of which will be found in the *Year Book of Pharmacy for 1875* from which the following passages have been extracted. "The juice forms a large article of internal

A. 604

**AGAVE
americana.****The American Aloe Fibre.**

trade in Mexico The plant is known as the Maguey or tree of wonders and even at the present time in some parts of Mexico it is considered one of the most important productions of the soil The use of the juice of the plant as an intoxicating beverage, is said by some to date back to the days of the early inhabitants of the Mexican Continent

SEVERAL VARIETIES OF THE PLANT are cultivated in Mexico each being known for the greater or lesser quantity of the juice it produces its colour whether yellow or greenish its thickness or sweetness or bitter taste These variations as to the properties or consistency of the juice depend a great deal upon the nature of the soil and of the range of temperature thus it is the least mucilaginous in a somewhat clayey soil and is cultivated with the greatest success at an elevation of about 9 000 feet

THE MODE OF PROPAGATION is by removing the young plants or suckers from the old ones and after spreading them on the ground for two or three months to partially dry them so that they may not rot instead of starting into growth they are planted in rows and barley sown between them which is considered rather to assist their growth In a good soil the Agave plant requires a period of from 10 to 12 years before attaining maturity The plant upon attaining its full growth which is easily discernible by its height and the prodigious extension of its leaves, brings forth a tall stem crowned with yellow flowers and then a certain amount of pruning becomes necessary so as to form a kind of reservoir in the centre and what is technically termed a *cara* or face around it so as to cause the juice to flow towards the same spot and to facilitate the extraction of it by removing some of the interior leaves and thorns

**PULQUE.
605**

TO COLLECT THE JUICE or *pulque* as it is called as soon as the leaves begin to turn yellow a small concave aperture is scooped in the core of the plant and an elongated tube like gourd the air in which is exhausted by suction is thrust into the aperture each labourer carries with him strapped to his back an impervious sheepskin bag into which the gourd tube is emptied as soon as it is filled The juice is emptied into vats and allowed to stand for about 36 hours when fermentation ensues and its yellow transparent colour changes into a milky white

TRADE IN PULQUE — Not less than 20 000 mules and donkeys laden with the beverage enter the city of Mexico every month by the gate leading to the Maguey district To the quantity paying duty must also be added a considerable quantity which is smuggled in and including this it may be calculated that about 50 000 000 bottles are now annually introduced into the city of Mexico

MEZCAL OR MEZCAL SPIRIT — Besides this *pulque* which as we have seen is the chief product of the *Agave* in Mexico a strong spirit is prepared from the sap known as *mezcal* also a kind of brandy of 80 degrees of strength a sweet thick substance resembling honey a concentrated gum used in medicine brown sugar loaf sugar sugar candy and vinegar of very excellent quality so that the *Agave* the value of which to us is mostly for its fibre is in fact one of the most important economic plants of Mexico (Year Book of Pharm 1875 232 also 1882 221)

**MEXICAL
SPIRIT
606
BRANDY
607
SUGAR FROM
AGAVE
608
VINEGAR
FROM AGAVE
609
FIBRE
610**

THE AMERICAN ALOE FIBRE.

The immense and growing demand for new and cheap textile materials has recently caused the fibre greatly to surpass the sap in importance In fact, the latter may be said to be unknown to the natives of India. It is much to be regretted that the same might almost be said of the fibre although various species of *Agave* are now widely cultivated, if not naturalised in India

A 610

The American Aloe Fibre.

AGAVE
americana.

Flourishing under the most diverse circumstances the Agave is in India eminently suited for providing a supply of fibre if not for trade and exportation at least for domestic purposes. Every encouragement should therefore be given to develop an interest in this most useful plant. In America rapid progress is being made in this direction and it is evident that with the American inexhaustible supply and with improved machinery the Pita fibre must sooner or later affect certain branches of the jute and other textile industries. For cordage it is now held in high esteem and the manufacturers assert that the fibre imported into England from America improves every year. It is composed of large filaments white brilliant and readily separated by friction without danger to the fibre. It takes colour freely and easily. It is light contracts under water rapidly and becomes fixed while it bears changes of humidity even more severe than can be resisted by the best hemp. In London the aloe fibre generally fetches from £35 to £40 a ton.

In Mauritius Agave fibre has attracted considerable attention within the past few years the sterilization of the soil through constant cultivation of sugarcane having forced upon the planter the necessity of adopting some new and less exhaustive crop. There are already some six companies in existence with a capital of £150 000 working the fibre which they appear to extract chiefly from *Fourcroya gigantea* (The green aloe) the fibre of which they export to Europe under the name of Mauritius Hemp.

CULTIVATION

The Agave is planted about 5 feet apart and the furrows 5 feet distant from each other so that an acre would contain from 1 600 to 2 000 plants. When about 7 to 8 years old the cutting may commence but by planting with off shoots this need be only some 3 or 4 years after the opening up of the plantation. They will continue to yield for four or five years. The Superintendent of the Hazaribagh Jail Dr R Oobb furnished the following report detailing the process adopted by him in the cultivation of the fibre which is here published in the hope that it may prove useful to interested persons —

Growth from seed — It may be grown from seed collected from the tall candelabra like stems thrown up by the plant after it has reached the age of from five to seven years. The seed should be planted in a nursery in rows 18 inches apart and the seeds 12 inches from each other. The best time to plant them (in Hazaribagh) is during the rains. They will then rarely fail to germinate and throw out leaves three or four inches long by the end of the year. If however they are put down in the dry season they require watering at least twice a week. The young plants should be allowed to remain in the nursery till the following rains when they may be transplanted to the hedge or plantation where they are intended to grow.

Growth from shoots — This is the best method because there is no chance of failure of germination the labour of sowing is saved and much time is gained. Young plants from one to two years old should be procured at the commencement of the rainy season and put down where they are intended to grow permanently. If for hedgerows a ditch should be dug and the young plants put on the top of the earth thrown up. They should not be closer than two feet from each other. The holes in which they are placed should be eight inches in depth and the earth should be well pressed round them. No further care is then required and in about three or four years the plants will grow quite close together and make an excellent fence. If it is intended to make an aloe plantation, the young shoots should be planted in rows ten feet apart and five or six feet should be allowed between each plant in the rows.

**AGAVE
americana****The American Aloe Fibre.**

"Soil — A gravelly or laterite soil appears to be best suited for the growth of the aloe plant. If the plantation is made on high ground, it is not necessary to make ridges to plant on and the plant is quite as prolific of young shoots, for experience has shown that they do equally well in the flat but in low situations and hollows it is necessary to make ridges 12 to 18 inches high, the plant being very partial to a light dry soil while a damp and water logged soil is death to it. No manure is required and it grows on the most stony ground where apparently there is not sufficient soil to support life in the plant. In some places it may be seen growing in the clefts of the rocks. We have not found it necessary to hoe or dig up the land near the plants and weeds grass &c. do not appear to interfere with its growth. From experiments which have been made here the use of the expressed juice of the leaves as manure has appeared to accelerate the growth of the plants.

Cutting the leaves — The leaves should not be cut until the aloe is six or seven years old after it has thrown up its tall candelabra like stem. Some of these grow to the height of 18 or 20 feet they flower and produce seeds before these are thrown up the fibre is weak and not fit for manufacture.

Protection of plantation — It is commonly supposed that cattle will not eat the aloe plant on account of its sharp pointed leaf and acrid sap but our experience has shown this to be an error. Several growing plants have had their leaves eaten and very young plants have been found cropped close to the ground. It is advisable therefore to keep off cattle by means of a ditch (outside) and a close aloe hedge round the plantation.

'Value of crop per acre — After the plant are seven or eight years old one acre of land may be expected to yield seven maunds of fibre per annum (it requires as much as forty maunds of leaves to make one maund of fibre). There is no doubt about this as repeated experiments have been made in this jail. After the ground has been planted no expenditure is required and the cost of planting depends greatly on the distance from which the plants have to be brought.

"Preparation of fibre — After the leaves are cut they are put through a crushing machine, invented by my jailor Mr Pimm which breaks the hard bark of the leaf and crushes out the juice. It has been found that a great deal of manual labour is saved by this process. The machine is not unlike a sugar crushing machine. This process should be carried on as near water as possible. Then the crushed leaves are pounded on a smooth stone by a wooden mallet until all the bark and woody matter are removed. The fibre is then washed until the whole of the sap and dirt is cleared out of it. It is dried in the sun and is then ready for use.

MANUFACTURE AND TRADE.

M Evenorde Ohazal has recently published a most interesting account of the cultivation of the plant and separation of the fibre as practised in Mauritius from which it would appear that the machinery used costs originally from £1 000 to £1 200 apart from the necessary buildings roads and purchase of land. From the outturn per acre generally published at from 40 to 70 tons of green leaf yielding about 1½ tons of fibre valued at £40 per ton it would take some four or five years before an Agave (or aloe) fibre-extracting factory could give any returns to the capitalist. It must not be overlooked however, that a large part of the above expenditure is for motive power and that if the industry were to be combined with that of the tea and coffee plantation or the indigo factory waste lands in the vicinity would become productive, and periods when

**MACHINERY
FOR AGAVE
FIBRE**

Agave Ropes.

AGAVE
americanus.

the factory is now silent would be fully and profitably occupied. A correspondent from Colombo in the *Tropical Agriculturist* for 1882-83, p. 429 strongly urges this view and he calculates that a "gratteuse" or fibre-extracting machine could easily be constructed for Rs200 and worked by any available motive power. The subject seems well worthy of the attention of our planters.

In the spring of 1882 what appears an excellent machine for the separation of this fibre was patented in the United States and favourably noticed and illustrated in the *Scientific American*. It is exceedingly probable however that the Ekman or some other chemical process of extraction of the fibre will supersede completely the mechanical. The *Planters Gazette* very justly remarks that a fibre would then be obtained fine enough for spinning and weaving purposes the market value of which would be three or four times as much as that obtained for the coarse fibre extracted by mechanical contrivances. In India there would be no difficulty in introducing the Ekman process since bisulphate of magnesia is easily and cheaply procurable. The Aloe fibre succeeds best where few if any trees will grow; the chemical process removes the difficulty regarding the fuel supply.

Two samples of Agave fibre from Mauritius were exhibited at the late Calcutta International Exhibition—the one in the Mauritius Court prepared by the usual process practised in that island, the other in the New South Wales Court prepared by a patent process invented by M G A Lusignan of Sydney.

ROPE

In India the Agave as a fibre producer, has attracted attention from time to time since 1798. In that year a Mr W Webb who had a plantation of it near Madras made ropes from it. He submitted a coil of this rope to the Military Board of Fort St George with a suggestion that he should be allowed to supply it in lieu of rope made in Europe. Captain P Malcolm of His Majesty's ship *Suffolk* after trying it reported it to be as strong as if not stronger than coir and as having the advantage of pliability. A committee of the Military Board after a trial with it were of opinion that it was at least equal in point of strength to the best European rope of the same size. As regards durability it was mentioned that part of a coil which had been fixed to the anchor of a boat and kept constantly under water for six months appeared to have undergone no other alteration than European rope would have done in the same situation.

At the beginning of the present century Dr Buchanan found the villagers in Mysore employing the Agave for making strong hedges and separating the fibre for cordage.

In 1841 rope was made at the Alipore Jail (Calcutta) from Agave plants grown there by the convalescent insane. The rope was tested and gave the following results as compared with other ropes—

| | |
|-----------------------------|--------|
| Agave rope broke with | 2 519½ |
| Coir rope (same dimensions) | 2 175 |
| Jute | 2 456½ |
| Country hemp (sunna) | 2 269½ |

In 1851 a varied assortment of string, cord, rope, and fibre undyed and dyed,—orange, red, maroon and green, as also paper made from the fibre—was prepared at the suggestion of Dr Hunter of Madras in his School of Arts and by the prisoners in the jail at Madras. The assortment was shown and admired at the London International Exhibition of that year. There existed at the time a small export trade in Agave fibre from the Madras Presidency to the United Kingdom, Bombay, Cutch, Gujarat,

Agave
Ropes.
611

**AGAVE
americana****Agave Fabrica.**

Sind and Bengal The value of this trade was in the official year 1852 53 put down as Rs 27 095 and in 1853 54 Rs 21 506 The quantity exported continued to decline until the trade practically died out It may be mentioned however that this was in all probability mainly due to the rapid growth of the jute trade which, at this period began to develop into a large and important industry

In 1852 **Dr G Tranter** Surgeon in charge of the United Malwa Contingent (Central India) forwarded to the Agri Horticultural Society of India some specimens of the fibre which he had extracted from *Agave* grown in Malwa where it is plentiful the specimens were reported to be quite equal in strength to the best Russian hemp

Dr Wight gives the following as the results of his experiments with the chief fibres in the Madras Presidency —

| | lbs |
|--|-----|
| Coir | 224 |
| Hibiscus Cannabinus | 290 |
| Sansevieria zeylanica | 316 |
| Gossypium herbaceum | 346 |
| Agave americana | 362 |
| Crotalaria juncea | 407 |
| Calotropis gigantea | 552 |
| The breaking strain of a rope is said to be 270 to 360 pounds as against Russian hemp at | 160 |

All this was shown and urged by **Dr Royle** nearly 30 years ago but as far as India is concerned no progress has been made except that the plant has spread and taken a firm hold of immense scattered tracts In concluding his notice of this fibre **Dr Royle** urges what we cannot do better than repeat that it is very desirable that experiments should be made with the view of discovering the climate best suited for the production of the strongest fibre the age at which the leaves should be cut how long they should be macerated if at all and the commercial value of the fibres yielded by the various species of *Agave* and *Fourcroya*. *Spons Encyclopaedia* contains an interesting account of the preparation of this fibre by mechanical means The writer urges that where cheap labour can be had the hand prepared fibres are preferable—an important consideration for India He further states that the leaves should be cut before the flower appears and that in fact they cannot be too young as the older the leaf the coarser the fibre (Compare with **Dr Oobbs** opinion based on his Hazáribagh experiments)

FABRICS

At the Calcutta International Exhibition 1883 84 some excellent samples of *Agave* fibre were exhibited from Mysore in Madras and from Hazárbagh in Bengal In the latter case large bundles of both dyed and undyed fibre were exhibited in the Economic Court as also samples of small carpets woven from the fibre So early as 1839 however carpets are reported to have been experimentally made in Balasore (Bengal) Mention is also made of *sataranjis* (carpets) being made in the Bulundshar district North West Provinces and in 1882 the Revenue and Agriculture Department received a sample of matting made of this fibre at Hoshiarpur in the Panjáb but the preparation of *Aloe* fibre must be regarded as in an experimental condition only as far as India is concerned The chief difficulties are the want of a collective supply (the plant being scattered along roadsides and not cultivated as a crop) and a cheap and convenient appliance for the extraction of the fibre

§ "The plant requires three years to come to perfection In Mexico

Paper Material

AGAVE
americana.

5,000 to 6,000 plants go to an acre, the average number of leaves being 40, and yielding 6 to 10 per cent of fibre. The leaves should be cut before they are over ripe. It is better to cut them too soon than too late as over-ripe leaves yield a coarse fibre of inferior colour. In Mexico the natives prepare the fibre in the following manner. The cut leaves are steeped in water then beaten and scraped to remove non fibrous portions washed and bleached in the sun. Another plan is to deprive the leaves of about 6 inches of the pointed end and after having been well beaten they are tied in bundles laid in heaps and allowed to ferment. After the beating the bundles are macerated in water for 14 days and then finally washed and dried. The process of retting having proved injurious to the fibres of all endogens mechanical contrivances are now used for separating fibres from the leaves of the Agave &c. The length of the fibre varies from 3 to 7 feet and the commercial article is white to straw white. The breaking strain of a rope has been stated at 270 lb to 362 lb as against Russian hemp at 160 lb. In its native countries the fibre is used in the manufacture of ropes hammocks twine &c. The short fibres have been carded and spun while the waste is an excellent material for the manufacture of coarse paper. Slips of paper weighing 39 grains bore an average weight of 89 lb as against Bank of England pulp 47 lb (*Spons Encycl*). As the plant is exceedingly hardy, very prolific and will grow in arid wastes where scarcely any other plant can live it might perhaps be advantageous to plant with Agave those districts in India in which the soil proves unfertile from the presence of alkaline salts &c. The experiment would not be costly and might give good results. Bousingault found the juice to contain over 6 per cent of cane sugar. The fermented juice *pulque* contained 35.4 grains of alcohol per litre. (*Surgeon C F H Warden Professor of Chemistry Medical College Calcutta*)

AS A PAPER MATERIAL

In India scarcely any Agave fibre is used in the manufacture of paper. In October 1877 the Revenue and Agriculture Department of the Government of India issued a Resolution requesting Provincial Governments to consider the utilization of the Agave fibre and especially directed the attention of the Government of Bombay to the advisability of making an experiment with it adding that there was a prospect of utilising large quantities of a material now almost altogether wasted. An experiment was accordingly made at the Girgaum Paper Mill and under the instructions of the Bombay Government 300 maunds of leaves were on 30th July furnished by the Collector of Dhana. The manager of the mill could not however conveniently use them and they lay in a heap until the middle of August when without having been previously prepared they were put into the steam machine to be worked up direct into paper. The result was of course a failure.

In Bengal at the Central Jail Hazárbágh an experiment was also undertaken. An area of 300 acres of waste land was put under Agave in 1878-79 to furnish stock to be experimented with at the jail paper mill. Samples of this fibre were also supplied to the Bally Paper Mills (Calcutta) where it was discovered that one of the greatest difficulties in the way of Agave fibre for paper manufacture was the fact that the young leaves yielded too fine a pulp. The best leaves were those three years old. A mixture was proved to be injurious and therefore a difficulty exists in the necessity of getting leaves uniformly of the same age and if possible leaves three years old.

For paper manufacture this fibre seems likely however to command a good market. It is the most highly approved of all the paper fibres

PAPER
613INDIAN EX-
PERIMENTS

A. 613

**AGAVE
Americana.****Medicinal Properties of Agave**

making a strong tough smooth paper which feels like oiled paper, and even while unsized, may be written upon without the ink running. 'Its price is governed by that of Manila hemp being generally £7 to £10 a ton less than the latter'. The fibre prepared in India is harsh and brittle though of good colour it is not met with in commerce (*Spons Encyclop*) The character of the Indian prepared fibre is chiefly due to the mode of its extraction

SOAP
614

SOAP SUBSTITUTE

The juice is made into soap. For this purpose it is expressed and the watery part evaporated either by artificial heat or by simple exposure to the sun. On its reaching a thick consistence it is made up into balls along with lye ash. This soap lathers with salt as well as with fresh water. A gallon of the sap yields about a pound of the soft extract (*Treasury of Botany U S Dispens Ed 15th &c &c*)

MEDICINAL PROPERTIES OF AGAVE

MEDICINE
The Leaves
615
Roots
616

Medicine—The leaves as also the root when cut, yield a saccharine juice which by evaporation may be converted into a syrup having a peculiar nauseous odour and acid taste it reddens litmus paper. This is administered by American doctors having attributed to it resolvent and alterative properties it is regarded as specially useful in syphilis. **Dr Ross** (*Pharm Ind* 235) is said to have employed the roots in secondary syphilis with great apparent benefit in the form of a decoction in the proportion of four ounces to one pint of water. The sap is stated to be laxative diuretic and emmenagogue and in doses of two fluid ounces three times a day has been found very useful in scurvy (*U S Dispens*) General Sheridan is reported to have used the juice with great success amongst his men who were suffering from scurvy in a small isolated post on the Texas border. The disagreeable smell of the juice which has been compared to that of putrid meat causes a person at first to turn from it in disgust but after a while the odour is overcome and a liking for it takes the place of the previous dislike (*Year Book Pharm* 1875 232). The large moist fleshy **LEAVES** are stated to have been used with much advantage as a poultice the fresh juice is applied to bruises and contusions. The **GUM** found exuding from the leaves and lower part of the stem is used in Mexico as a cure for toothache.

Decoction
617
Sap
618

Leaves as a
poultice
619
Fresh Juice
620
Gum
621

§ The pulp of the leaves placed between folds of muslin is applied to the eye in conjunctivitis it is also used mixed with sugar in gonorrhœa twice a day the dose being ʒii (by weight) (*Honv Surgeon P Kinsley Chicacole Ganjam District Madras*) Not used medicinally I think in South India it is cultivated as a hedge and for making fibre (*Deputy Surgeon General G Bidie C I E Madras*)

Roots
622

The roots are diuretic (*Lindley*) (*Dr H W Hill Mánbhum*) "Used by the natives in chronic gonorrhœa" (*Surgeon Major F M Zorab Balasore*)

DOMESTIC USES

DOMESTIC
Razor strops
623
A cork sub-
stitute
624
Roofing
625
Fuel
626

The dry flowering stem is cut up into useful razor strops and used as a substitute for cork. The leaves and stems are employed in roofing the decayed leaves are also used as fuel when firewood is scarce, the terminal spines serve as pins and nails (*Cleghorn*) Wall plaster impregnated with the expressed juice is said to be proof against the ravages of white ants. Sugar vinegar, and a kind of beer and brandy are made from the sap.

Spines, 627 Wall plaster 628

| The Bastard Aloe. | AGAVE vivipara. |
|---|---|
| Agave angustifolia is cultivated as a source of fibre, but is not distinguished by the planter from A. americana . | 629 |
| A. saponaria is a powerful detergent its roots are used as a substitute for soap (<i>Lindley's Vegetable Kingdom</i> , 1847 pp 157 158) Compare with remarks given under A. americana as to the detergent properties of the sap of that species | 630 |
| A. sisalana | |
| THE HENEQUEN FIBRE OF SISAL HEMP OF AMERICA | |
| This fibre is rapidly gaining favour It is said to be prepared without maceration The leaf is laid upon a board and scraped with a wooden fork till all the pulp has been removed The fibre is then bleached and dried in the sun It is more easily dyed than any other fibre of this class and is thus very useful for making fancy articles of different kinds At the same time <i>Henequen</i> is now made into sacks and used in the grain trade The following extract from <i>Christy's New Commercial Plants</i> will be found interesting as showing the progress made in the Sisal Hemp industry — | FIBRE. Leaves. 631 Sacking 632 Fancy articles 633 |
| In Yucatan the two varieties of the fibre are distinguished as the <i>Yashqui henequen</i> which produces the best quality and the <i>Sacqui henequen</i> which gives the greatest quantity It is worked by machinery and from July 1875 to June 1876 Yucatan produced 22 000 000 lbs of Henequen fibre 18 000 000 lbs of which were sent to British ports The remainder was sent to Cuba and Mexico I am unable to give the figures as to the American importation in late years but the amount must be considerable as the fibre is now in high favour as a cordage material manufacturers claiming that it has been growing better and better each year in quality A few figures are given in the latter part of the flax and hemp report under the heading 'Other Fibres' which will give some idea of the amount consumed at present in this country A recent report published in Yucatan gives the following figures Taking 1 1/2 lbs of fibre for the yearly production of each Henequen plant we come to the conclusion that at present there are more than 18 000 000 plants under cultivation For this number of plants over 420 scraping wheels are in operation moved by 229 steam-engines with a force of 1 732 horse power and 10 wheels moved by animal power Each scraping wheel cleans daily on an average 300 lbs of fibre so the 450 wheels in existence do not work at present 163 days in the year | Yashqui fibre. 634 Sacqui fibre. 635 |
| It is estimated that in Yucatan alone a capital of over \$5 000 000 is vested in this industry | |
| A peculiarity of this fibre is that it resists the action of dampness for a greater length of time than hemp or similar fibres which makes it very desirable in the manufacture of cable ropes &c used in the rigging of ships | |
| CULTIVATION AND YIELD OF FIBRE — As cultivated in Mexico an acre generally contains 5 000 to 6 000 plants A dry stony soil is selected for its cultivation Young plants 2 to 3 feet high are planted out 12 feet apart and weeded twice a year The yield commences by the lower leaves being cut off about the fifth year and this is continued annually for ten years or more Of the shoots that spring up at the 8th 10th or 12th year one is left to replace the parent plant which is then destroyed and the other daughter off shoots are transplanted The annual yield of fibre is about a ton an acre, | |
| A. vivipara, L | 636 |
| THE BASTARD ALOE | |
| Syn. — AGAVE CANTALA, Roxb This may prove but a variety of A. americana . | |
| Vern — <i>Khetki, háshi chingár, OUDH; Kathalai, TAM; Petha-balehantha erikatali (BELLARY) TEL Kantala SANS.</i> | |
| Habitat. —Commoner in upper than in lower India, specially in the North West Provinces almost unknown in Bengal | A. 636 |

**AGLAIA
edulis.****Agave Soap.**

Botanic Diagnosis—Some authors seem to think this should not be regarded as a variety of *A. americana*, but rather as a distinct species differing as it does chiefly in the fact that it raises its cluster of leaves upon a short erect stem which produces viviparous buds. It is altogether a much less robust plant. The leaves are less fleshy and erect instead of reflexed. The flowering stem is not more than half the height of that of *A. americana*, and much thinner and red coloured. When seen growing side by side they appear quite distinct.

Stewart identified this plant with Roxburgh's *A. Cantala*, and seemed to think it was indigenous to India. There is little doubt however that all the members of this group have been imported from America and even Roxburgh with the imperfect botanical literature at his disposal arrived at the conclusion that the plant had been introduced by Europeans from the name *bélati dnanash* (European Pine Apple) applied to the species of Agave. Royle observed that on a rich soil this species becomes viviparous, while on a poor stony soil and under a dry climate seeds alone are produced.

Fibre—The *Oudh Gazetteer* says it is chiefly grown as a hedge to keep back cattle but in the jails good fibre is prepared from its leaves.

Medicine—§ The juice along with the flower of *Eleusine coracana*, is applied to contusions of draught cattle. (Surgeon Major W. Dymock Bombay.)

Agave Soap, see *A. saponaria* and *A. americana*.

Agila-wood, see *Aquilaria Agallocha* Roxb.

639

AGLAIA, Lour. Gen. Pl. I, 334

A genus of trees or shrubs glabrous lepidote or stellately pubescent (belonging to the Natural Order MELIACEÆ and the Tribe TRICHILIEÆ) comprising some 50 species inhabitants of China India the Malaya and the Islands of the Pacific.

Leaves pinnate or trifoliate leaflets quite entire. *Flowers* polygamodiceous small globose or turbinate (not oblong linear) numerous paniculate. *Calyx* and *corolla* each 5 lobed. *Stamens* united into an urceolate tube. *anthers* 5 included or sub-exserted erect. *Disk* small. *Ovary* 1 3 celled with 2 1 ovules in each cell. *style* very short. *Berry* dry 1 2-celled and seeded.

This genus is now made to include *Nemedia* Fuss. and *Milnea* Roxb. the former used to be referred to *Amoora* and the latter retained as a distinct genus. (See *Appendix to Gen. Pl. I*.) *Aglaia*, a Gr. proper name *Ἀγλαία* derived from *ἀγλαία* beauty splendour—the youngest of the Three Graces.

A species collected by Kurz in the Andaman Islands *A. ? andamanica*, Hiern is called in Burmese *Tau ahnyeen*.

640

Aglaia edulis, A. Gray Fl. Br. Ind. I 556

Vern—*Late mahwa* NEPAL; *Sinakadang* LEPCHA Gums: GÁRO HILLS and SYLHET.

Habitat—A middling sized tree of Eastern Bengal as also the Gáro Hills and Sylhet flowering in June-July fruit ripening two or three months later.

Botanic Diagnosis—Shoots leaves and inflorescence with ferruginous scales, mixed with stellate hairs, leaflets 9-13 opposite or sub-opposite. *Flowers* shortly pedicelled arranged in pyramidal panicles shorter than the leaves.

A 640

FIBRE
637
MEDICINE
633

| Timbers used for Implements | AGRICULTURAL IMPLEMENTS |
|-----------------------------|----------------------------|
|-----------------------------|----------------------------|

Properties and Uses—

Food—Fruit eaten by the natives **Roxburgh** says the natives of the Garo Hills and Sylhet eat the large succulent aril which surrounds the seed under the cortex of the berry

FOOD
Fruit.
641

Aglaia minutiflora, Bedd Fl Br Ind I 557**642**

Habitat—A handsome tree 25 to 40 feet in height with exceedingly hard wood was collected in Courtallum by **Voigt** and by **Beddome** at Travancore altitude 2 500 feet **Griffith** and **Maingay** found it in Tenasserim and Malacca

Botanic Diagnosis—*Leaflets* 7 15 pubescence ferruginous or rufous stellate narrowly elliptic acuminate *Panicles* divaricately branched many flowered half to as long as the leaves *Fruit* sub globose 1 2 seeded $\frac{3}{4}$ to 1 by $\frac{1}{2}$ by $\frac{1}{4}$ inch

A odorata, Lour Fl Br Ind, I 554 Wight Ic, t 511**643**

Habitat—An elegant shrub or small tree met with in the Eastern Peninsula often cultivated in gardens on account of its sweetly scented flowers

Botanic Diagnosis—Extremities of the young shoots covered with stellate hairs rapidly becoming glabrous *Leaflets* 3 5 rarely 7 obtuse *Panicles* lax flowered *ovary* hairy

A Roxburghiana, Miq Fl Br Ind, I 555 Wight Ic t 166**644**

Vern—*Priyangu* BENG HIND and SANS

Habitat—A large tree of the Western Peninsula from the Konkan and Midnapore southwards Ceylon ascending to 6 000 feet Singapore *Distrib*—Java Sumatra and other Malay Islands

Botanic Diagnosis—*Leaflets* 5 rarely 7 or 3 elliptic obtuse glabrescent *Panicles* dense flowered somewhat supra axillary pyramidal elongate *flowers* on very short pedicels $\frac{1}{2}$ in diameter *Calyx* yellow often covered with stellate hairs *Fruit* $\frac{3}{4}$ in diameter buff coloured minutely pilose

Properties and Uses—

Food—Fruit said to be edible

Medicine—§ Is regarded by Sanskrit writers to be cooling and useful in burning of the body and painful micturition The fruits are described as sweet astringent and tonic (*U C Dutt Civil Medical Officer Serampore*)

FOOD
Fruit
645
MEDICINE
Fruit
646
TIMBER
647

AGRICULTURAL IMPLEMENTS AND MACHINERY,

Timbers used for

Acacia arabica**A Catechu****A ferruginea****A melanoxylon,****A modesta.****A planifrons****Acer oblongum****A pictum (ploughs)****Adina cordifolia****Ægle Marmelos.****Albizia amara (ploughs)****A procera****Anogeissus pendula****Bauhinia purpurea.****B variegata****Berrya Ammonilla.****Briedelia retusa** (agricultural implements and cattle yokes)**Buchanania latifolia** (cattle yokes)**Calophyllum inophyllum** (machinery)**Capparis aphylla.****Caryota urens****Cassia Fistula****C siamea** (mallets)

AGRIMONIA
Eupatorium**Agrimony***Agricultural Implements and Machinery Timbers used for—(continued)*

| | |
|---|--|
| Castanopsis rufescens | Pinus excelsa (spades) |
| Chloroxylon Swietenia (ploughs) | Plectronia didyma. |
| Cordia Myxa | Prosopis spicigera |
| C Rothii | Pterocarpus Marsupium. |
| Cratoxylon nerifolium | Quercus dilatata. |
| Dalbergia cultrata | Q fenestrata |
| D latifolia | Q Ilex |
| D Sissoo | Q incana (ploughs) |
| Daphnidium pulcherrimum (cattle yokes) | Q semecarpifolia (ploughs) |
| Dolichandrone falcata | Randia dumetorum |
| Ehretia laevis | Salvadora oleoides |
| Eugenia Jambolana. | Schleichera trijuga. |
| E operculata | Securanea obovata |
| Feronia Elephantum | Shorea robusta (Santal ploughs) |
| Flacourtia Ramontchi | Soymida febrifuga (ploughs) |
| Fraxinus floribunda (ploughs) | Stephegyne parvifolia |
| Har dwckia binata (machinery) | Strychnos Nux vomica. |
| Hentiera Papilio | S potatorum |
| Hymenodictyon excelsum | Tamarix articulata (ploughs) |
| Kydia calycina (ploughs) | Tecoma undulata |
| Lagerstroemia parviflora | Tectona grandis |
| Melia Azadirachta | Terminalia Arjuna |
| Milusa velutina | T belerica (ploughs) |
| Milletia pendula (harrows) | T Chebula |
| Morus serrata | T paniculata (ploughs) |
| Murraya Konigii | Tetranthera monoptala. |
| Odina Wodier (cattle yokes) | Trewia nudiflora |
| Olea ferruginea. | Wendlandia exserta |
| Ougeinia dalbergioides. | Xylia dolabriformis |
| Phyllanthus Emblica. | Zizyphus Jujuba |
| | Z. xylopyra |

648

AGRIMONIA, Linn Gen Pl I 622

A small genus of herbs (belonging to the Natural Order ROSACEÆ) containing in all some 8 species 3 of which are met with in India

Leaves interruptedly pinnate *stipules* slightly adnate *Flowers* small yellow in terminal spike like racemes 2 bracteolate *pedicels* bracteate at the base *Calyx* persistent *tube* turbinate spinous *mouth* contracted *lobes* 5 triangular imbricate *Petals* 5 *Stamens* 5 10 or more inserted at the mouth of the calyx *Disk* lining the calyx tube its margin thickened *Carpels* 2 included in the calyx tube, *styles* exserted *stigmas* 2 lobed *ovule* 1 pendulous *Fruit* enclosed within the hardened spinous calyx

649

Agrimonia Eupatorium, Linn, Fl Br Ind, II, 361

Habitat—An herb of the temperate regions frequenting hedgerows and thickets It is common in England America and India in the latter all along the Himálaya from Kashmír to Sikkim altitude 3,000 to 10 000 feet, and to the Khásia Naga, and Mishmi hills

Medicine—From the remotest times Agrimony has enjoyed a high reputation amongst the herbalists of Europe it is strange that it should

MEDICINE**A 649**

Fodder Grasses.

AGROSTIS
tenacissima.

be apparently quite unknown to the native doctors of India The root is a powerful astringent a useful tonic and a mild febrifuge The whole plant also yields a dye which seems to be unknown to the hill people of India

Root
650
DYE.
651

Agrimony Hemp, see *Eupatorium cannabinum*, Linn COMPOSITE

AGROSTIS, Linn Gen Pl III 1149

652

A genus of grasses the type of the Tribe AGROSTIDÆ (Natural Order CRAMINÆÆ) comprising about 100 species distributed through the colder temperate regions

Creeping annual or perennial grasses *Panicle* loose *spikelets* laterally compressed 1 flowered *Glumes* membranous acute unarmed the upper being smaller than the lower *Flower* with hairs at its base and no rudiment *Palea*, unequal scarious dorsal awn falling short of the glumes or wanting *Stamens* generally 3 *Style* short distinct *stigma* feathered *A canina* Linn does not possess the inner pale

Mr Duthie enumerates amongst others the following species as met with in the N W Provinces Very little is known regarding the economic uses of the Indian members of this genus

Agrostis alba, Linn Duthie's Grasses 29

653

FLORIN OR WHITE BENT GRASS

Syn —A STOLONIFERA Savt A SYLVATICA Host

Habitat —Northern India and ascending the Himalaya up to 13 000 feet Grows in all kinds of soils delights in one that is rich and moist In Europe it frequents fields and the sand on the sea-shore

Botanic Diagnosis —*Stem* procumbent creeping often with long stoles *sheath* rough *ligula* long acute *Panicle* spreading in flower afterwards becoming close *Pedicels* very much toothed *Florets* rarely awned *glumes* nearly equal lower toothed through its keel

Fodder —A most valuable fodder grass

FODDER.
654
655

A canina, Linn Duthie's Grasses 29

Syn —A RUBRA Linn AGRANLUS CANINUS Beauv TRICHODIUM CANINUM Schrad

Habitat.—Western Tibet altitude 12 000 feet in Europe common on heaths

Botanic Diagnosis —*Branches* and *pedicels* rough *sheath* smooth *ligule* oblong acute *Glumes* unequal acute lower pale jagged at the top 4 ribbed kneed and twisted awn from below the middle of and exceeding the pale lower setaceous and tufted

A ciliata Trin Duthie's Grasses 29

656

Syn —LACHNAGROSTIS CILIATA Nees

Habitat —North West Himalaya from 8 000 to 15 000 feet

A diandra, Linn Roxb Fl Ind Ed C B C 106

THE *benajoni* BENG Syn for *Sporobolus diander*, Beauv, which see

A maxima, Roxb Fl Ind, Ed C.B.C, 107 Syn for *Thysanotoma acarifera*, Nees which see

A. tenacissima, Linn Roxb, Fl Ind, Ed C B C, 106 Syn for *Sporobolus tenacissimus* Beauv which see

**AILANTHUS
excelsa****A Classified List of the Plants****Agar-wood, see Aquilaria Agallocha, Roxb**

657

AILANTHUS, Desf Gen Pl I 309

A small genus of lofty trees (belonging to the Natural Order SIMARUBEÆ) comprising 3-4 species of which two are met with in India.

Leaves very large unequally pinnate *Flowers* small polygamous in terminal or axillary panicles *Calyx* 5 fid lobes equal imbricate *Petals* 5 valvate *Disk* 10-lobed *Stamens* 10 (in the hermaphrodite flowers 2-3) *Ovary* 2-5 partite *ovules* one in each cell *Fruit* a one seeded samara

The generic name is said to be derived from *Ailanto* the vernacular name for a species met with in the Moluccas

658

Ailanthus excelsa, Roxb Fl Br Ind I 518 Wight Ill I t 67

Vern—*Maha rukha mah rukha* Umbado HIND *mahanimb* MAR *Mahanim mahala gormi kawat* URIYA *Ghorkaram* PALAMOW *Moto- aduso* GUJ *Varul mah rukh* DUK *Arwa* N W P and MEYWAR *Peru pee perumaruttu* TAM *Pedu pey pedda pedd manu putta* TEL *Perumarum* MAL *Madalá aralu* SANS

Habitat—A tree about 60 to 80 feet in height somewhat resembling the ash probably introduced into India common in the North West Provinces Behar the Western Peninsula and the Carnatic In the Bombay Presidency widely distributed over the Kaira Panch Mahals and Gujarát District occasionally met with in Rajputana (*Raj Gaz* 27) Common on the Coromandel Coast and in Ceylon

Botanic Diagnosis—*Leaves* 1-2 feet long glandularly hairy *leaflets* very coarsely toothed *Stamens* with the filaments about half the length of the anther *Samara* 2 inches by $\frac{1}{2}$ inch red twisted

Gum—A red gum sent from Madras to the Panjáb Exhibition is said to have been prepared from this plant at Chingleput It resembles Moringa gum and consists of large rounded tears of a deep vinous red

Medicine—THE BARK is aromatic and used for dyspeptic complaints it is also regarded as tonic and febrifuge in cases of debility Expecto- rant and antispasmodic given in chronic bronchitis and asthma (*Bomb Gaz* VI p 15) The leaves and the bark are used as a medicine (*Bomb Gaz* VII 42) This bark has a pleasant and somewhat aromatic taste and is prescribed by the native practitioners in infusion in dyspeptic complaints to the extent of three ounces twice daily (*Ainslie*) Dr Dymock says this description is scarcely correct the bark is intensely bitter like quassia In Bombay the bark and the leaves are in great repute as a tonic especially in debility after child birth The name *Maharuk* is also applied to a species of cinnamon by the Konkani gardeners of Bombay (*Dr Dymock Mat Med W Ind* 116) The Surgeon General Madras in forwarding through the local Government to the Supreme Government certain proposals regarding a future edition of the *Pharmacopæia of India* suggested that the bitter principle of the bark of this plant should be made officinal A powder made from the resin mixed with milk is given in small doses in dysentery and bronchitis

§ Used also as an astringent in diarrhoea and dysentery Natives mix it with curds (*Surgeon Major W D Stewart Cuttack*)

Chemical Composition—This substance has not been carefully examined but Dr Dymock informs me that Mr N Daji separated an acid principle which he named *Ailantic acid* It is reddish brown very bitter very easily soluble in water, less in alcohol and ether and insoluble in chloroform and benzol Mr N Daji also found a bitter non-crystallizable principle, but he attributes the medicinal virtue to Ailantic acid "Ailantic acid may be given in doses of 1 to 3 grains and is said to be tonic and alterative In large doses it causes nausea and vomit

GUM
659MEDICINE
Bark
660Ailantic Acid
661

A. 661

upon which wild Silk-worms feed

AILANTHUS glandulosa.

ing and is purgative. He recommends its use in dyspepsia with constipation. Mr. Narayan Daji's paper is of a high class. (*Deputy Surgeon General G. Bidie Midris*)

Structure of the Wood—Soft white similar to that of *A. malabarica*. Weight 28 lbs per cubic foot. Dr. Dymock says that the microscopic structure of the bark shows large stony cells collected together in groups. There are also many conglomerate raphides.

Used to make floats for fishing nets and lines, sword handles, spear sheaths and catamarans (*Ainslie Roxburgh*). The wood is used in making drums and sword sheaths (*Bomb. Gas VII p 42*).

TIMBER
662

Ailanthus glandulosa, Desf. *Fl. Br. Ind. I* 518. Brundis *For. Fl.* 58.

663

Incorrectly called the JAPAN VARNISH TREE, *Eng.* GÖTTERBAUM (*Tree of the Gods*) *Ger.* VERNIS DU JAPON *Fr.*

Habitat—A lofty tree met with in North India, most probably introduced from Japan. Extensively cultivated on the Continent as an avenue tree along with the tulip tree, the horse-chestnut, the plane, &c. The leaves are not liable to be attacked by insects, and therefore until the first frosts of November the tree remains covered with its large leaves, affording a grateful shade. It grows rapidly, throwing up abundant root suckers, and has for that reason been employed in plantations made to clothe barren stony hills in the south of France (*Gamble*).

Botanic Diagnosis—*Leaves* often exceeding 1 foot, pubescent or subglabrous, leaflets very numerous, coarsely toothed at the base. *Stamens* exerted, filaments several times the length of the anthers. *Samara* 1 inch by $\frac{1}{2}$ inch, membranous, linear-oblong.

Sericulture—Upon the leaves of this tree the wild silk worm *Attacus Cynthia Drury* is reared in Europe, and it is perhaps the most successful tree for the experimental rearing of different species of silk worms. It grows freely even in England, and the insects thrive upon it. It is anticipated that the rearing of *Attacus Cynthia* upon this tree may become an established industry in Europe.

SERICULTURE
664

In connection with the subject of the value of *Ailanthus* as a food for silk worms, it seems highly desirable that experiments be performed in India with the object of producing a *reelable hybrid eri* cocoon, which would still preserve the valuable property of feeding upon an annual plant such as the castor oil. The *Ailanthus glandulosa* has proved a most convenient plant for experimenting with Indian wild insects in Europe, but both for experiments in India and in Europe (as far as the respective climates will permit) the following plants are those which would most probably afford the means of prosecuting the investigations necessary for the production of hybrids of Indian indigenous silk worms. The plants have been grouped in a way which brings out the overlappings in habit, as also some of the structural affinities of the more important species of silk worm.

TEMPERATE PLANTS

665

* *Actias* and *Caligula* Series.

1st—Rosaceous plants such as *Prunus Cerasus* (the wild cherry), *Pyrus communis* (the wild pear) and *Cydonia vulgaris* (the wild quince), small trees met with in India on the Himalaya and the hills of the Eastern Peninsula at altitudes of from 5,000 to 10,000 feet.

The following species of silk worms feed upon these plants in their wild state: *Actias selene*, *Caligula simla*, *C. tibeta*.

A. 665

**AILANTHUS
glandulosa.****A Classified List of the Plants**

and — *Pieris ovalifolia* an exceedingly plentiful Ericaceous small tree coming into fresh green foliage just before and flowering during the rains on the Himálaya and mountains of the Eastern Peninsula at altitudes of from 4 000 to 8 000 feet

The following insects feed upon it *Actias selene* *Caligula thibeta*

**** Actias and Attacus Series**

3rd — *Ailanthus excelsa* and *A. glandulosa* (the former would most probably not succeed in England)

The following are the insects regularly found feeding on these trees in India *Attacus ricini* (the *eri silk worm*) and *A. cynthia*

4th — *Coriaria nepalensis* a small leafy bush belonging to the Natural Order CORIARIÆ (allied to MORINGÆ and FICUMINOSÆ) plentiful on the Himálaya and mountains of the Eastern Peninsula Burma and the Straits altitude from 5 000 to 10 000 feet Should grow freely in England This is one of the most curious plants enumerated in this list and for the purpose of rearing hybrids seems the most hopeful

The following insects feed upon it in their wild state *Actias selene* *Attacus canningi* and *A. ricini*

666

WARM TEMPERATE PLANTS***** Attacus, Antheræa, and Cricula, or the Eri, Munga, Cricula and Tusser Series**

5th — *Symplocos cratægoides* *S. grandiflora*, and *S. ramosissima*, Small trees or shrubs on the Himálaya and lower hills of India ascending to 7 000 feet in altitude

The following insects are known to feed upon these plants or are actually fed upon them in their semi-domesticated condition *Attacus atlas* *A. ricini* (small red form of *Eri*) and *Antheræa assama* (the *Munga silk worm*)

6th — *Ricinus communis* (the common castor oil plant) cultivated in the plains of India and on the hills up to an altitude of 7 000 to 8 000 feet Crowned as an annual in England ornamental forms having been produced by the gardeners

The following are the insects which feed on this plant *Attacus ricini* (the *Eri silk worm*) This is its principal food in domestication and also in its wild state *A. cynthia* and *Antheræa myletta* (the *Tusser silk worm*)

7th — Species of Laurels in India chiefly *Machilus odoratissima* (up to altitude 8 000 feet, the principal food of the *Munga*) and *Tetranthera polyantha*.

The following are the insects which feed on these plants as also on one or two allied species of laurels *Antheræa assama* (the *Munga silk*) and *Cricula trifenestrata* (the common wild yellow reticulated cocoon of Burma and of the South and West of India) Upon the former tree these insects chiefly feed both in their wild and semi-domesticated conditions

667

TROPICAL PLANTS

It is necessary to add to the experimental plantation one or two other trees with the view of admitting of a more thorough investigation of the forms and possible hybridisation of the *Tusser silk-worm*

****** The Tusser Series**

8th — *Zizyphus Jujuba*.

9th — *Lagerstræmia indica*.

A. 667

upon which wild Silk worms feed.

**AILANTHUS
malabarica.**

Two small trees or bushes which experience has shown to be perhaps upon the whole the best plants for the cultivation of the tusser worm

10th—*Terminalia tomentosa* and one or two allied species (the myrobalan or wild almond family) These are the trees which the tusser worm seems to prefer most in its wild condition

In the above brief indication of the food materials of certain silk worms only the more important species or the genera most likely to afford useful hybrids have been mentioned

It is interesting to observe that this climato-botanical classification brings the indigenous silk worms of India into groups closely corresponding to those formed upon a more scientific principle It would almost seem that hybridisation to be successful must pass through these natural affinities It is remarkable that none of the Indian SATURNIDÆ (the family to which the foregoing silk worms belong) show the slightest tendency to feed on the plants upon which the mulberry silk worms (the BOMBYCIDÆ) are reared—a fact which gives some weight to the idea that the latter are not truly indigenous to India (For further information consult the account given under *Silk*)

MEDICINAL PROPERTIES AND USES

According to Prof Hetet the bark of *Ailanthus glandulosa* is an active vermifuge in powder it has a strong narcotic nauseating odour It exercises a powerful depressing influence on the nervous system similar to that of tobacco Various preparations of the bark administered by Prof Hetet to dogs had a purgative effect with the discharge of worms The powdered bark has been given in one or two cases of tape-worm in the human subject and proved remarkably successful in expelling the worm and at the same time operating on the bowels

It was found that the depressing effects on the nervous system were due to the presence of the volatile oil the resin having no such influence The oleo-resin produces the same effects as the powdered bark and has the advantage that it keeps better The dose of the powdered bark sufficient for the expulsion of tape worm was found to be from 5 to 30 grains the oleo-resin somewhat smaller (*U S Dispens 15th Ed 1564*)

Structure of the Wood—Extremely durable pale yellow of silvery lustre when planed and therefore valued for joiners work it is tougher than oak or elm easily worked and not liable to split or warp (*Baron F Von Mueller*)

It grows exceedingly rapidly sending out numerous suckers from the roots and as it is not particular about soil it is admirably suited for the reclamation of waste lands Professor Meehan states that it interposes the spread of the rose bug to which the tree is destructive (*Extra Trop Plants Baron F Von Mueller*)

Ailanthus malabarica, DC Fl Br Ind I 518 Wight Ic 1
1604

Vern—Peru peru-marattup-pattas maddi-pāl TAM; Perumarum pedda manu-patta maddi palu TEL Peru-marat toli mattip-pāl MAL Guggula-dhup ud MAR, Dhup baga-dhup gogul-dhup KAN Manda dupa HASSAN Mattipal ANAMALAIS No Burmese name Kambalu walbiling koombaloo-gass wal-biling gass CINGH

Habitat.—A large deciduous tree of the evergreen tropical forests abundant in the Western Ghāts rare in Pegu but met with on the

MEDICINE
The Bark
668

TIMBER
669

670

A 670

AJUGA

Mutipál Resin

RESIN
671

eastern slopes and in the valley of the Tsit tounge Often planted in South India for ornamental purposes

Botanic Diagnosis—*Leaves* very large *leaflets* distant almost entire nearly glabrous *Stamens* exerted upon filaments many times longer than the anthers *Samara* large rounded at both ends not twisted

Resin—On incision the bark yields a dark coloured soft resin known as *Mattipal* which in time hardens into a brittle resin with a strong balsamic odour

§ Exudes a reddish gum (J E Hardinge Rangoon)

Mr Broughton Quinologist to Government of Madras reported upon the resin as follows This resin as commonly met with is dark brown or grey in colour is plastic opaque and has an agreeable smell It contains much impurity The pure resin is very soft having the consistence of thick treacle and this is doubtless the reason why it is always mixed with fragments of wood and earth which make it more easy to handle The sample which I examined contained but 77 per cent of resin the remainder being adulterations Alcohol readily dissolves the resin and on evaporation leaves it as a very viscous transparent light brown semi liquid which does not solidify by many days exposure to a steam heat when burned it gives out a fragrance and hence it is sometimes used for incense Its perfume is however inferior to that produced by many other resins employed in the concoction of the incense employed in Christian and heathen worship The peculiar consistency of the resin would enable it to substitute Venice turpentine for many purposes though its price (£6 for 25 lbs in the crude state) forbids an extensive employment

Resin burnt as an incense in Hindu temples (*Bomb Gaz XV Pt I 61*)

MEDICINE

Resin
672
rult
673

Medicine—The RESIN called *mutipal* was first discovered by **Dr Buchanan** It is used medicinally especially in dysentery **Dr Gibson** regards it as a good stimulant in bronchitic affections (*Pharm Ind 50*)

The FRUIT is considered useful in cases of ophthalmia (*Aitchison Kuram Valley Plants in Four Linn Soc*) The fruit triturated with mango and mixed with rice is reckoned useful in cases of ophthalmia (*Surgeon Major Dymock Bombay*)

Bark
674

The BARK is bitter and given in the treatment of dyspepsia **Wight** describes this bark as rough and very thick studded with bright garnet looking grains apparently of a resinous nature which do not dissolve either in spirit or water A further knowledge of this bark and its exudation is desirable (*Pharm Ind*)

§ A valuable substitute for Ipecacuanha in the treatment of dysentery Fresh juice of bark (1 oz) with equal quantity of curd morning and evening proves highly useful Commonly used by natives of all classes (*Surgeon E W Savinge Rajamundry Godavery Madras*)

This tree is very common in the Vizagapatam District I have frequently used a decoction of the bark in chronic dysentery with the very best effect (*Hony Surgeon Easton Alfred Morris Negapatam*) The root bark coarsely bruised and kept soaking in gingelly oil when given internally is said to be an antidote for cobra poisoning (*Surgeon Major D R Thompson Madras*)

TIMBER
675

Structure of the Wood—White very soft and spongy Weight 23 lbs per cubic foot Useless

Ajowan, see *Carum copticum*, *Benth* UMBELLIFERÆ

676

AJUGA, Linn Gen Pl II 1222

A small genus of herbaceous plants (belonging to the Natural Order LABIATÆ) containing some 30 species *Corolla* with upper lip very short

A 676

Medicine, Timber

ALANGIUM
Lamarckii

2 lobed lower 3 lobed and much longer than the upper. *Calyx* ovate bell shaped nearly equally 5 toothed. *Stamens* parallel protruding beyond the upper lip of the corolla the lower pair the longer. One of the most marked features of the genus is the prevalence of leaves or bracts in the spike like inflorescence causing them to appear more like an ACANTHACEÆ than LABIATÆ.

Ajuga bracteosa, Wall DC Prod VII 589

Vern—*Katpath* KUMAON *Kauri bôti* JHUM *Karku nilkantshi* SUTIK *Khi rhanri* IRAN'S INDUS PANJABI NAME—The bazar names are *Janadam mukund babri nilkantsi* Mr. Baden Powell gives *jan i adam* as the vernacular of **Ajuga reptans**, a European species and Stewart further gives that name to **Salvia lanata**.

Habitat.—A small herbaceous plant met with on the Himalaya altitude 2000 to 3000 feet extending from Afghanistan to Nepal.

Medicine—*Jan i adam* is described as a bitter astringent nearly inodorous sometime substituted for cinchona in the treatment of fevers (Baden Powell). *Mukund babri*—On the Salt Range it is used to kill lice and is regarded as depurative (Stewart). An aromatic tonic specially useful in ague (Baden Powell).

There appears to be some confusion as to the identification of the medicinal products sold in the bazars of the Punjab and North West Provinces under the names of *Jan i adam* and *Mukund babri*. The leaves of the species of **Ajuga** have a peculiar resinous not disagreeable odour and a bitter balsamic taste. They are said to be stimulant diuretic and aperient. They have been given in rheumatism gout palsy and amenorrhœa in doses of from 12 drachms (U S Dispens).

A. fruticosa, Roxb Fl Ind Ed C B C 458 Syn for **Anisomeles malabarica**, R Br**Akakia**—This is an extract prepared from a species of **Acacia**—see **A arabica****Akakiya**, a redstone said to be used medicinally Dr Irvine in his *Medical Topography of Ajmere* mentions this drug and says it contains iron. It is used as a tonic.**ALANGIUM**, Lam Gen Pl I 949

A genus of shrubs or small trees containing only 2 species (belonging to the Natural Order (URNACEÆ). Leaves alternate petioled entire 3 nerved at the base persistent. Flowers hermaphrodite fascicled up on the naked twigs silky white jointed on the pedicel bracts absent. Petals narrow, much elongated. Stamens twice or thrice the petals. Ovary inferior 1-celled surmounted by a disk style long stigma capitate ovule pendulous. Fruit a berry crowned by the disk and the enlarged calyx. Seed with crumpled cotyledons and ruminated albumen.

The generic name appears to be the Tamil name *Alangi* Latinised

Alangium Lamarckii, Thwaites Fl Br Ind II, 741 Wight Ic, t 194

Syn—A HEXAPETALUM, Roxb Fl Ind Ed C B C, 404; A DECAPE TALUM Lam (Kurs I 543)

Vern—*Akola thasila-ankul, dhera* HIND *Kalâ-akolâ ankola*, BOMB; *Onkla* GUJ *Ankol* MAR *Akar kanta bagh-ankurâ dhalâkura* (U C Dutt) BENG *Dela*, SANTAL *Kimri* MAL (S P) *Ankol* KOL *Ankula, dolanku* URIYA *Asinghi-maram ashinyi alangi* TAM *Urgu, údugachettu woodiya-chettoo* (in Godavari Dist)

A. 681

677

MEDICINE
678

679

680

681

**ALANGIUM
Lamarckii.****The Alangium**

kudagu amkolam chettu TEL *Ankola anisaruli udagina gida*
ansaroli KAN *Uru ankola* GOND *Ankota SANS Eepatta* CINGH

Habitat.—A deciduous shrub or small tree met with throughout India and Burma in tropical forests

MEDICINE
Root bark
682

Medicine.—The ROOT BARK is used in native medicine being regarded as anthelmintic and purgative. It is mentioned by Sanskrit writers as the *Ankota* and has a reputation in leprosy and skin diseases. **Dr Moodeen Sheriff** in his valuable *Supplement to the Pharmacopæia of India* says

It has proved itself an efficient and safe emetic in doses of fifty grains in smaller doses it is nauseant and febrifuge. The bark is very bitter and its repute in skin diseases is not without foundation. In an official correspondence forwarded to the Supreme Government regarding the *Pharmacopæia of India* **Dr Moodeen Sheriff** says further of this drug

It possesses the emetic and nauseant properties of *ipecacuanha*. Is used by natives in cases of leprosy and syphilitic and other skin diseases and appears to be valuable in this respect. It is useful in simple continued fever. **Drury** says it is also employed in dropsical cases and pulverised is a reputed antidote in snake bites. The Malays believe the fruit to be a hydragogue purgative.

Assistant Surgeon S Arjun (*Bombay Drugs p 70*) states that the leaves are used as a poultice to relieve rheumatic pains (*Dymock's Mat Med W Ind 332*)

§ My experience of the root bark of the white flowered variety of *Alangium Lamarckii* (*A decapetalum*) is much greater than before and I am now able not only to confirm my former opinion as to its efficiency as an emetic in 45 or 50 grain doses but also to speak of some of its other medicinal properties in more favourable terms. In the early stage of leprosy psoriasis secondary syphilis and some other skin diseases its benefit is satisfactory if it is used sufficiently long according to the nature of each disease and individual case. It is a good substitute for *ipecacuanha* and proves useful in all the diseases in which the latter is indicated except dysentery. As a diaphoretic and antipyretic it has been found useful in relieving pyrexia in many cases of simple slight continued and idiopathic fevers. It is very frequently resorted to as an alexiteric by natives of this country especially in cases of bites from rabid animals. Powder is the most convenient form of using the root bark. **Doses.**—As an emetic from 45 to 50 grains as a nauseant diaphoretic and febrifuge from 6 to 10 grains and as an alterative tonic from 2 to 5 grains (*Hony Surgeon Moodeen Sheriff Madras*)

The root is described by Sanskrit writers as heating, pungent and acrid. It is laxative and useful in worms colic inflammations and poisonous bites. The fruit is said to be cooling tonic nutritive useful in burning of the body consumption and in hæmorrhages (*U C Dutt Civil Medical Officer Serampore*)

There are two or three sorts with flowers dark white and red the bark of the latter is used as an antidote in snake poisoning (*Surgeon Major F F L Ratton Salem*). The root bark pulverised and mixed with nutmeg mace and cloves of each grs 20 is given to check the progress of leprosy 40 grains of the powder of this bark made into a bolus is given in cases of cobra poisoning. It is well worth trying in such cases (*Surgeon Lee Mangalore*). The oil of the root bark is said to be a useful external application in acute rheumatism. No personal experience (*Surgeon Joseph Parker M.D Poona*)

Food.—The fruit a fleshy one-seeded drupe is eaten though astringent and acid (*Bom Gas XV*)

FOOD
Fruit.
683

A. 683

The Albizzia.

ALBIZZIA
amara.

Structure of the Wood—Sapwood light yellow heartwood brown hard close and even grained tough and strong easily worked with a beautiful glossy surface The wood is beautiful (Roxb.) **Wight** found it to sustain a weight of 310 lbs Weight 49 to 56 lbs According to the *Mysore Gazetteer* the wood is strong and beautiful

It is used as pestles for oil mills wooden bells for cattle and other purposes and is valuable as fuel

TIMBER
684

ALBIZZIA, Duraz Gen Pl I 596

685

A genus of unarmed trees (belonging to the Natural Order LEGUMINOSÆ and the Sub-Order MIMOSÆ) comprising some 30 species distributed through the tropics of the Old World

Leaves bipinnate often glandular at the base of the petiole or between certain pinnae **Flowers** in globose heads sessile or pedicellate usually pentamerous and all hermaphrodite **Calyx** campanulate or funnel shaped distinctly toothed **Corolla** funnel shaped **petals** firmly united below the middle **Stamens** indefinite monodelphous at the base (true in Acacia) **filaments** several times the length of the corolla **anthers** minute not gland-crested **Ovary** sessile or only shortly stalked **stigma** minute **Pod** large thin flat strap shaped sutures not thickened

The *Flora of British India* refers the Indian species to two sections —

* LEAFLETS OBLONG AT LEAST $\frac{1}{4}$ INCH BROAD

A. *Lebbek*, A. *pedicellata*, A. *odoratissima*, A. *procera*, A. *lucida*, and A. *glaucaeflora*.

** LEAFLETS NARROW DIMIDIATE LANCEOLATE WITH THE MIDRIB CLOSE TO THE UPPER EDGE

A. *julibrissin*, A. *stipulata*, A. *myriophylla*, and A. *amara*

Albizzia amara, Boivin Fl Br Ind II 301

686

Syn—A. AMARA and A. WIGHTII *Grah* (*Beddome*, t. 61 xviii) MIMOSA AMARA and M. PULCHELLA *K. at Fl Ind Ed C B C 418*

Vern—Lulai or li MAR Moto arasio GU Thuringi wunya suranji shek am TAM Nallarenga shek ani sikkai na lingi Ili Wusel MADURA (MADRAS) Bil kambu KAN Kadsige COORG Omsulay MAL Kr shna sirish SAI S

Habitat—A moderate sized deciduous tree met with in South India and the Deccan also Ceylon and distributed to Abyssinia and Kordofan

Botanic Diagnosis—Pinnae 8-10 and 13 inch long rachis densely pubescent leaflets 30-60 $\frac{1}{2}$ inch long sessile caducous finely pubescent stipules minute caducous **Heads of flowers** crowded in the axils of much reduced leaves **Pods** distinctly stalked 6-9 inches by $\frac{3}{4}$ 1 inch and 6-10-seeded

Properties and Uses—

Gum.—It yields a good gum not very much known

Medicine—§ Described by Sanskrit writers as cooling and useful in erysipelas eye disease inflammation and ulcers (U C Dutt Civil Medical Officer Serampore)

Structure of the Wood.—Sapwood large heartwood purplish brown beautifully mottled, extremely hard with alternate concentric light and dark bands.

Skinner gives the weight at 70 lbs **Gamble's** specimens weighed 61 to 62 lbs **Skinner** also says The wood is strong fibrous and stiff close-grained, hard and durable superior to sal and teak in transverse strength and direct cohesive power also that it is used for the beams of native houses and carts the wood of the crooked branches for ploughs

Beddome states that it is a good fuel and is extensively used for the locomotives at Salem and Bangalore (*Gamble*)

GUM.
687
MEDICINE.
688
TIMBER.
689

A. 689

**ALBIZZIA
Lebbek****The Pink Siris Tree**

DOMESTIC
USES
690
691

In the *Bombay Gazetteer* XV I p 61 occurs the following (in the account of the Konkan) The tree is common and yields dark brown close-grained and very strong and durable timber one of the most favourite woods in Kanara A seasoned cubic foot weighs about 70 pounds

Domestic Uses—The natives use the leaves as a detergent for washing the hair

Albizzia anthelmintica

A native of Abyssinia has recently attracted considerable attention as an anthelmintic It is known as *Musenna* or *bisenna* The Abyssinians employ the powdered bark to expel the tape worm to which they are subject owing to the habit of eating raw flesh About two ounces of the powdered bark are taken in the morning either suspended in water or made into a confection with honey It produces no pain and does not purge The same day portions of the worm are expelled the remainder next morning

This tree might with advantage be introduced into India.

692 A Julibrissin, Durazz Fl Br Ind II 300**THE PINK SIRIS**

Syn—*MIMOSA KAIKORA* Roxb *Fl Ind Ed CBC 418* (?) A
JULIBRISSIN Willd

Vern—*Sirin kurmrur surangru shirsh shishi buna tandai mathirshi*
brind PB Lal siris baraulia barau bhokra HIND Kalkora (?)
BENG

Habitat—A moderate sized deciduous ornamental tree with fragrant blossoms met with in the Himalaya from the Indus to Sikkim ascending to 7000 feet

Botanic Diagnosis—*Pinnæ* 8-24 *rachis* downy with a gland between the upper pinnæ *leaflets* 20-50 sessile sensitive $\frac{1}{4}$ inch long cuspidate with the mid rib close to the straight upper edge *stipules* and *bracts* caducous *Heads of flowers* not paniced but crowded in the leafless upper nodes *Corolla* 3 times as long as the calyx *Pods* glabrous 5-6 inches long by $\frac{1}{2}$ to 1 inch 8-12 seeded narrowed to the beak and to the short stalk

Medicine—Used like **A Lebbek** Stewart says the word *Julibrissin* is derived from *Gul abresham* in Egypt J being pronounced as G

Structure of the Wood—Sapwood large heartwood dark brown almost black in old trees beautifully mottled shining Annual rings distinctly marked by a sharp line Weight 43 to 52 lbs per cubic foot

Used to make furniture

MEDICINE
693
TIMBER
694

695 A. Lebbek, Benth Fl Br Ind II 298**THE SIRIS TREE**

Syn—*ACACIA SIRISSA Ham A Lebbek Willd (DC Prod)* A SPECIOSA Willd *MIMOSA SPECIOSA Jacq M SIRISSA Roxb ALBIZZIA LATIFOLIA Boivin*

Vern—*Siris sirin sirar siras sirai mathirshi lasrin kalsis tantia garso*
HIND ; *Sirisha siris BENG Pit shirish SANS Chapot siris SANTAL*
Tinia URIYA Vaghe kot vaghe TAM Dirasan darshana kat vaghe
pedda duchirram TEL Kal baghi bengha dirisana, godda hunshe
KAN *Chichola motha siras MAR Doli saras PANCH MAHALS Pulo*
sarsho GUJ Sirasa shirrus suri SIND Kokko or kuk-ko BURM
Beymadu gachode AND

Habitat—A large deciduous spreading tree found wild or cultivated in most parts of India grows in the evergreen mixed forests in the Sub-

A. 695

The Siris Tree.

ALBIZZIA
Lebbek.

Himálayan tract from the Indus eastward in Bengal Burma Central and South India ascending to 5000 feet in altitude.

§ A handsome and common tree in the town of Madras grows best when self sown yields a gum (*Deputy Surgeon General G Bide C.I.E. Madras*)

Botanic Diagnosis—*Pinnæ* 4-8 *leaflets* 8-18 short stalked obtuse oblique 1 1/2 inch long and 1/2 broad *Heads of flowers* not prickled 3-4 together *Corolla* greenish yellow twice the length of the calyx *Pod* strap shaped yellow brown 1/2-1 foot long by 3/4 1 1/2 inch broad 6-10-seeded

An ornamental tree with light-coloured bark exceedingly good for avenues Its roots do not penetrate very deep it may be propagated readily by cuttings

Properties and Uses—

Gum.—It yields a gum which is said not to be soluble in water but merely to form a jelly It resembles gum arabic **Roxburgh** states that he has often seen large masses of pure gum upon this plant while other authors give conflicting opinions regarding its properties **Mr Baden Powell** says that under the name of *lera* it is used as an adulterant for pure gum arabic in calico-printing and in the preparation of gold and silver leaf cloths The *Mysore Gasetteer* remarks that the tree yields a good gum (*Vol I p 27*) A dark gum oozes from wounds in the bark (*Bombay Gasetteer Vol I Pt I 61*)

Tan.—The bark is said to be used in tanning leather

Oil.—An oil extracted from the seeds is considered useful in leprosy

Medicine.—The SEEDS are officinal forming part of an *anján* used for ophthalmic diseases (*Stewart*) They are astringent and are given in piles diarrhœa gonorrhœa &c The oil extracted from them is considered useful in leprosy The bark is applied to injuries to the eye (*Madden*)

The FLOWERS are considered by the natives a cooling medicine and are externally applied to boils eruptions and swellings they are regarded as an antidote to poisons The LEAVES are regarded as useful in ophthalmia (*Bide Powell s l anjab l rod s v Acacia speciosa, p 345*)

§ Powdered seeds in doses of 6 mashas=3 1/2 have been successfully administered in cases of scrofulous enlargement of the glands A paste of pounded seeds and water is useful as a local application at the same time (*Asst Surgeon Gholam Nibi Pesháwar*) This is sometimes used in ophthalmia but my experience of it is too limited to enable me to give any opinion (*Surgeon Major C F McKenna*) The powder of the root bark is used to strengthen the gums when they are spongy and ulcerated (*Native Surgeon Ruthnam Moodelliar Chingleput Madras*)

Fodder.—The leaves are used for camel fodder It is often cultivated as a fodder plant in Mysore The tree grows rapidly and flourishes on almost any soil especially on canal embankments and roadsides affording both fodder and fuel where these are otherwise scarce Deserves to be cultivated to a much greater extent than at present

Structure of the Wood.—Sapwood large white heartwood dark brown hard shining mottled with deeper coloured longitudinal streaks The annual rings in trees grown in the Panjáb are marked by a distinct line Weight 40 to 60 lbs per cubic foot It seasons works and polishes well and is fairly durable The value of the tree may be inferred from the fact that the Burmese Government fixed a higher tax upon the felling of *kuk ko* than for teak or any other tree. (*Burma Gasetteer I 128*)

It is used for picture frames sugarcane crushers, oil mills furniture

GUM
696TAN
697
OIL
698
MEDICINE
Seeds
699
Bark
700MEDICINE
Flowers
701
Leaves
702Bark
703
FODDER.
704TIMBER.
705

ALBIZZIA
odoratissima**The Sweetly-scented Albizzia**

well curbs canoes (Burma) and wheel work in South India for boats In the Andamans where trees of large size are procurable it is utilised for building but more usually for house posts Used for furniture and picture-frames in Mysore In the Deccan the wood is regarded as of excellent quality In Northern India it is considered unlucky to employ the timber in house building (*Drury Robt &c*) It is a common practice to pollard the tree the cuttings being used as firewood

706

Albizzia lophantha, Benth Fl Br Ind II 298

Habitat—An Australian small tree or bush now largely grown in India naturalised on the Nilgiri Hills

Botanic Diagnosis—Closely resembles *A. amara* only that the flowers are in spikes One of the most rapidly growing trees for copses affording temporary shade in exposed localities

Tan—The bark may be used in tanning It contains about 8 per cent of *mimosa tannin* but Mr Rummel found in the root about 10 per cent of *saponin* valuable in silk and wool factories Saponin also occurs in *Xylia dolabriformis* of South Asia (*Baron I Von Mueller Extra Trop Pl*) The pods when crushed give out a peculiar smell said to be due to some oil compound to that met with in mustard (*Fluck and Hanb Pharm*)

TAN
Bark
707Pods
708

709

A. lucida, Benth Fl Br Ind II 299

Syn—*MIMOSA LUCIDA* Roxb Fl Ind Fl C B C 417

Vern—*Sil karn* BENG *Sil karai* ASS *Tapria siris* NEPAL *Ngraem* LEPCHA *Mei guch* ASS *Gunhi* MAGH *Thanthat* BURM

Habitat—A large deciduous tree met with in Eastern Bengal Assam and Burma

Botanic Diagnosis—*Pinna* unijugate leaflets 2 to 4 rarely 6 oblong acute 2 to 4 inches long glabrous bright green Panicles of heads umbellate or corymbose

Structure of the Wood—Heartwood hard brown with dark streaks and alternating dark and light coloured concentric bands Average weight 50 lbs per cubic foot

It is hard and good and used for pots in Assam

TIMBER
710

711

A. odoratissima, Benth Fl Br Ind II 299

Syn—*MIMOSA ODORATISSIMA* Kunt Fl Ind Ed C B C 418

Vern—*Siris sirā bhandir ber a b la sein ban a* HIND *Jang siris* SANTAL *Lasrin karnbru polach* PB *Chichua chichola yerjoohetia* COND *Chichira* KURKU *Jati korai siris* ASS *Siroo* GARO *Koroi* CACHAR *Tedong* LEPCHA *Kalthuringi kar vaghe karu veng bilwara solomanini sela vanjai karuvaga* TAM *Shinduga chindu tisu yerruchinta karu vage* TEL *Lullibaghi billawar bilwara* KAN *Siris chichua, chichada sirā shiras* KONKAN BOMB DUK MAR *Kal sarasio* GUJ *Kali saras or harreri* PANCH MAHALS *Hure mari* CINGH *Thitmagyi* BURM

Habitat—A large deciduous tree met with in the Sub-Himalayan tract from the Indus eastward ascending to 3 000 feet in altitude in Bengal Assam Burma and Central and South India

Botanic Diagnosis—*Pinna* 6-8 with a gland between the 12 pairs leaflets 16-40 sessile obtuse very oblique glaucous beneath strongly veined with the mid rib parallel to and at a little distance from the upper edge $\frac{1}{4}$ -1 inch by $\frac{1}{4}$ inch Heads of flowers copiously paniced each few flowered apricot scented pale greenish white

A 711

| The Rain Tree | ALBIZZIA Saman |
|---|--|
| <p><i>Properties and Uses—</i></p> <p>Gum.—It yields a dark brown gum in rounded tears tasteless but soluble in water</p> <p>Dye.—§ The bark is boiled by the Gáro people together with the leaves of the <i>dugal Sarcoclamys pulcherrima</i>, and the yarn for their cloth to give the latter a brownish colour (<i>Mr G Mann Conservator of Forests Assam</i>)</p> <p>Medicine—The bark applied externally is considered efficacious in leprosy and in inveterate ulcers</p> <p>§ The leaves boiled in <i>ghis</i> are used by the Santals as a remedy for coughs (<i>Rev A Campbell Pachumbi</i>)</p> <p>Fodder—The leaves and twigs are used for fodder and in the Konkan they are regarded as of excellent quality (<i>Bomb Gas</i>)</p> <p>Structure of the Wood—Sapwood large white heartwood dark brown with darker streaks very hard Dark narrow concentric bands (annual rings?) alternating with bands of lighter colour Grain ornamental but rather open (<i>Cleg horn</i>) It seasons works and polishes well and is fairly durable Weight 42 to 60 lbs per cubic foot</p> <p>It is used for wheel oil mill and furniture The timber is excellent for all purposes requiring strength and durability One of the most valuable of jungle timbers found around the villages of the Indian peasant It is the principal wood used for cart wheels in Gujarát</p> | <p>GUM 712 DYE 713</p> <p>MEDICINE Bark 714</p> <p>FODDER 715 TIMBER. 716</p> |
| <p>Albizzia procera, Benth Fl Br Ind II 299</p> <p>Syn—<i>MIMOSA ELATA Roxb Fl Ind Ed C B C 418</i></p> <p>Vern—<i>Sufed siris gurar karra karo karanj; gurbari gurkur haro karolu Garso HIND Koroi or kori BENG ASS Kili or khili GÁRO Pandrai, Kóí Garso KHARWAR Ia kri MECH Sitti siris NEPAL Takmur 'EPCHA Ia e ginnu GOND Sarapatris tinia URIYA Karallu kinai tihiri BOMB K ini BHÍL Kana i DUK Ainai MAR A nhai (THANA) KONKAN Konda vaghe TAM Peddapattseru tella sopara tella chindagu TEL Chikul KAN Choi MAGH Seet or sit BURM Burda AND</i></p> <p>Habitat.—A large deciduous fast growing tree found in the Sub Himálayan tract from the Jumna eastward in Bengal and Behar in the Satpura Range in the Central Provinces in Gujarát and South India and Burma</p> | <p>717</p> |
| <p><i>Properties and Uses—</i></p> <p>Gum.—This tree yields large quantities of gum</p> <p>Tan—The bark is sometimes used as a tan</p> <p>Structure of the Wood—Sapwood large yellowish white not durable heartwood hard brown shining with alternate belts of darker and lighter colour The wood is straight and even grained seasons well and the heartwood is durable Weight 26 to 60 lbs per cubic foot Yields excellent timber and is in great request. (<i>Bomb Gas XV p 61</i>)</p> <p>It is used for sugarcane-crushers rice pounders wheels agricultural implements bridges and house-posts It is used by tea-planters for stakes for laying out tea gardens as it is found to split well and occasion ally it is also used for tea boxes it is found to be very good for charcoal</p> | <p>GUM 718 TAN 719 TIMBER 720</p> |
| <p>A. (Pithecolobium) Saman, F v Mueller</p> <p>THE RAIN TREE OF GUANGO</p> <p>Habitat.—A native of Mexico Brazil, and Peru it is experimentally cultivated in most warm-temperate countries, and would succeed well in many parts of India especially in the vicinity of the sea or salt lakes Is one of the best trees for roadsides</p> | <p>A. 720</p> |

ALBUMEN

Gum used for Sizing Daphne Paper

TIMBER
721

The wood is hard and ornamental but the principal utility of the tree lies in its pulpy pods which are produced in great abundance and constitute a very fattening fodder for all kinds of pastoral animals which eat them with relish (*Mueller Extra Tropical Plants*)

722

Albizzia stipulata, *Borwin Fl Br Ind II 300*

Syn—*MIMOSA STIPULACEA* Roxb *Fl Ind Ed C B C 418*

Vern—*Siran kanujera pattia samsundra* HIND *Chakua amluki* BENG *Oc il sir n shirsha kav r* IB *Chapun kera serum* KOL *Bunsibri MECHI Kala siris* NEPAL *Singr anu LEPCHA Sow sau* ASS *Selch GARO Kat i ranji TAM Konda chiraku chindaga* TEL *Udala BOMB MAR Phalnri (IHANA) KONKAN Shembar* PANCH MAHALS *Kal baghi hote baghi bagana* KAN *Kabal CINGH Pokoh bhum mai sa* MAGH *Cabal mara gass bumaisa bnumesa* BURM

Habitat—A large deciduous fast growing tree met with in the Sub Himalayan tract from the Indus eastward ascending to 4 000 feet, in Oudh Bengal Burma and South India

Botanic Diagnosis—*Pinnae* 12 40 with many glands on the rachis *leaflets* 40 80 $\frac{1}{8}$ inch or less in breadth sessile finely downy with a slightly recurved acute point *stipules* and *bracts* large membranous downy cordate acute persistent *Heads of flowers* panicle terminal racemes densely pubescent *Pod* 5 6 inches by $\frac{1}{2}$ 1 inch pale brown thin indehiscent sub sessile 8 10 seeded

This tree is attracting considerable attention in Assam It has been found that tea flourishes better under it than when exposed to the sun The most favourable explanation of this fact is that the leaves manure the soil the roots which do not penetrate deep tend to open up the soil while the shade is not so severe as to injure the tea the leaves closing at night and during early morning

Properties and Uses—

Gum—It yields a gum which exudes copiously from the stem and is used by the Nepalese for sizing their Daphne paper

Fodder—The branches are lopped for cattle fodder (*Gamble*)

Structure of the Wood—Sapwood large white heartwood brown generally not durable soft shining Weight 25 to 45 lbs per cubic foot It is also used as fuel

It is said by **Beddome** probably quoting **Skinner** to be used for building and for navies of wheels **Kurz** says it is good for cabinet work furniture and similar purposes *Brandis Burma List 186 No 27* says it is prized for cart wheels and for wooden bells In Bengal it has been tried for tea boxes for which purpose it will probably suit well also for charcoal Said to be much used in South Kanara

GUM
723
FODDER
724
TIMBER
725
Fuel
726

ALBUMEN

727

Albumen

A term which in chemistry means a compound containing nitrogen in addition to the carbon hydrogen and oxygen of the starches It is readily known by its coagulating with heat The white of an egg is a good example of this compound in animal matter but it is also largely present in vegetable substances and especially so in the sap of plants

In botanical science however the term An Albumen has come to have a widely different meaning It is a layer of albuminous matter (albumen fibrine and casein together with starches) surrounding the embryo and within the seed coats In the pea albuminous matter is stored within the embryo itself filling its seed leaves (the halves of the pea) and such a seed is therefore *exalbuminous* in botanical terminology In

A 727

Vinous Fermentation

ALCOHOL

the castor-oil seed on the other hand the albuminous matter forms a distinct and complete layer around the embryo (or infant plant) and such is therefore regarded as an *albuminous* seed. An exalbuminous seed does not imply the absence of albuminous matter (chemically) but the absence of a peculiar layer of such matter around the infant plant and within the seed-coats.

Medicine—Albumen is described in the *Indian Pharmacopæia* as emollient, demulcent and nutritive. It acts as an antidote to the soluble salts of copper and zinc and corrosive sublimate or creosote.

Chemical Note—§ Albuminoid or proteid is a generic term given to the chief mass of nitrogenous material of plants and animals. All proteids contain nitrogen, carbon, hydrogen, oxygen (sulphur and phosphorus). The white of egg is an example of an animal proteid while in vegetable juices which are coagulated by heat a substance exists which is either identical with or closely resembles egg albumen. Proteids have been divided into classes by **Hopper-Seyler** and comprise egg albumen, serum albumen, myosin, globulin, fibrinogen, vitellin, filerine. Besides these there are devoid albumens obtained by the reaction of reagents on an albumen. Thus albuminoid which has been digested or dissolved by the gastric juice is called a peptone (*Watts*). A peptone differs in a most marked manner from the proteid from which it has been obtained. It is very soluble in water and is not precipitated by heat. It is also soluble in dilute alcohol. It is uncrystallizable and devoid of odour and almost tasteless. (*Surgeon Warden Prof of Chemistry Medical College Calcutta*)

§ Eggs are very useful in cases of anemia resulting from loss of blood or chronic discharges. They also act as an aphrodisiac. In combination with *kundur* it is employed in chronic bronchitis and with *kuttan* in asthma. A mixture composed of eggs *kobroba* and *tahashir* is said to act as a powerful astringent and is used in hemorrhage and chronic diarrhoea. Yolk of egg is often applied locally to the part bitten by a snake.

A liniment composed of eggs *rogungul* and *babuna* is said to be a very useful local application in ophthalmia and orchitis. An ointment made with *mom rogungul* has been employed with benefit in cases of severe neuralgia and other painful affections. Yolk of egg mixed with *sira kirmant* and spread over a piece of paper and applied while warm over the loin is said to remove the pain. Eggs are also used as a local application in cases of burns and scalds. Eggs burnt to ashes and mixed with honey are said to be very efficacious in removing the opacity of the cornea. (*Assistant Surgeon Gholam Nabi Feshawar*)

ALCOHOL

Alcohol

729

The product of vinous fermentation. Through the agency of the fungus—Yeast—sweet liquids have their chemical constituents rearranged. They are then said to be fermented and the spirit or pure alcohol formed may be separated from admixture by distillation.

Chemical Note—§ Chemically alcohol means a neutral compound of oxygen, carbon and hydrogen from which an ether can be obtained. Usually however the term is restricted to ethylic alcohol—spirits of wine. Alcohol is a product of the fermentation of saccharine matter by the action of a fungus the *Saccharomyces cerevisiae* a constituent of yeast. In commerce three varieties of alcohol of different strengths are recognised—Absolute Alcohol, Rectified Spirits and Proof Spirits. Absolute Alcohol is alcohol which has been deprived of water. Rectified Spirit is Absolute Alcohol mixed with 16 per cent of water by weight and Proof Spirit,

ALEURITES
cordata.**The Aleurites.****Proof spirit**
730**Rectified spirit**
731
Methylated spirit
732**MEDICINE**
733

Absolute Alcohol with 50·76 per cent of water. The strength therefore of an alcoholic liquid may be expressed in terms of one of these three varieties of alcohol. For excise purposes Proof under Proof and over Proof are terms which are constantly employed. Formerly the strength of spirit was ascertained by pouring some of it over gunpowder and igniting the spirit. If the powder inflamed the spirit was Proof but if weaker the gunpowder was too much moistened by the water and would not explode and the spirit was under Proof. The composition of Proof spirit has been defined by Act of Parliament and is of the strength already stated. If the spirit be stronger than Proof spirit it is said to be so many degrees or per cent over proof or O P and if weaker so much per cent under Proof U P. A liquor described as being 20 degrees U P means that 100 parts of the spirit contain 80 parts of Proof spirit and 20 parts of water while a liquor 20 O P means that if 100 parts of the spirit were diluted with water till the mixture measured 120 parts the product would be Proof spirit. For purposes of manufacture &c Rectified spirit is issued duty free after admixture with a certain percentage of commercial wood *naphtha*. This addition renders the spirit unfit for potable purposes and the spirit so treated is known as Methylated Spirit of Wine. In India for certain trade purposes the Excise Department permit the addition of caoutchouc in lieu of wood spirit. (*Surgeon Warden Prof of Chemistry Midval College Calcutta*)

Medicine—It is chiefly used for chemical purposes and in the preparation of tinctures. Rectified spirit is a powerful diffusible stimulant useful as an evaporating lotion but not administered internally *per se*.

Alder, see *Alnus glutinosa* and *A. nepalensis*

734**ALEURITES, Forst Gen Pl III 292**

A small genus of *FUJIBIACEÆ* containing trees with long petiolate simple or lobed leaves with glands at the base. *Calyx* 3 partite valvate in bud. *Petals* 5 twice as long as the sepals. *Disk* present in both sexes often minute or reduced to glands. *Stamen* indefinite on a conical naked torus erect in bud. *anthers* parallel dehiscing longitudinally. *Ovary* 5 cell d with a solitary ovule in each cell. *style* 5 as many as the cells deeply bifid. *Fruit* drupaceous of 5 cocci endocarp crustaceous exocarp succulent. *Seeds* compressed globular with a spurious white aril. *albumen* only. *cotyledons* large the radicle minute.

The generic name is derived from *αλευριτης* made of wheaten flour because of the mealiness of the plant.

735**Aleurites cordata, Mull**

Syn—*ALEURITES VERNICIA Hassk A. CORDATA R Br ALÆOCOCCA VERNICIA Spreng*

Vern—*Fun*, CHINESE Sometimes called the WOOD-OIL of CHINA

Habitat—This exceedingly interesting tree is said to have been found by Wallich in Nepal (*Wall Cat N 7958*) but apparently it must be very rare or its valuable properties are quite unknown to the natives of India.

Varnish—In the New Report for 1880 p 11 this is said to be the plant which yields the Chinese varnish (formerly supposed to be the same as the Japanese varnish *Rhus vernicifera*). Samples of variously coloured lacquers were exhibited at the Calcutta International Exhibition from Tonquin which were most probably obtained from this plant. **Mueller** (*Extra Tropical Plants*) says This tree for its beauty and durable wood deserves cultivation in our plantations in humid districts. The oil is an article of enormous consumption amongst the Chinese who use it in the caulking and painting of junks and boats for preserving wood work, varnishing furniture and also in medicine. (*Fluck and*

VARNISH
Chinese wood oil
736**A 736**

Candle-nut Tree.

ALEURITES
moluccana.

Hamb Pharm 91) Lindley (*Veg Kingdom 1847 pp 278 280*) states that the Ceylon gum lac is made from *A. laccifera*.

Aleurites moluccana, Willd DC Prod XV pt 2 723

737

THE BELGAUM OF INDIAN WALNUT THE CANDLE NUT

Syn.—A TRILOBA Forst

Vern—*Akrót akola jangli ákrót* HIND BENG *Akshota* SANS (Sak har m Arjun Bombay) *Khasife hind jousebarri* ARAB *Girdagane hindi chahar maghse hindi* PERS *Jangli eranda jelapa jangli akhróta or akrot j bhal* BOMB *Akhoda* GUJ *Japhala akhud* MAR; *Akrota* CUTCH *N ttu akrótu k ttai* TAM *Nátu akrítu vittu* TRI *Nat akródu* KAN *Kakkuna* SINGH *To úkya* BURM *Shih lei* CHINA The names given in most parts of India to this plant are those which more properly belong to the Walnut the *akrot* It is therefore advisable to add the word wild = *Jangli ákrót*

Habitat.—A handsome tree introduced from the Malay Archipelago and now found in cultivation or run wild in many parts of South India *Roxburgh* says of it A large tree now pretty common in gardens about Calcutta Flowering time the hot season seeds ripen in August *Oleghorn* remarks that it thrives well in Madras

Botanic Diagnosis—Leaves and twigs covered with a br whitish stellate scaly minute tomentum *Leaves* ovate to truncate-obtuse having two glands acute or acuminate often 3 lobed *Panicles* on the extremities of the branches covered with scaly tomentum and crowded with white flowers

Properties and Uses—

Gum.—Bark smooth olive green a gum often naturally exuding from the stem and found also upon the fruit This gummy substance is said to be chewed by the Tahitians especially that from the fruit

Dye—The *Treasury of Botany* says the root of the tree affords a brown dye which is used by the Sandwich Islanders for dyeing their native cloths This may be the brown dye of Fonkin of which samples were exhibited at the Calcutta International Exhibition of 1883 84

Oil—NUT OIL OR ARTISTS OIL—The nuts of this plant contain 50 per cent of oil which is extracted and used as food and for burning It is known as *Aekuna* in South India and Ceylon The nuts when strung upon a thin strip of bamboo and lighted are said to burn like a candle Strung upon strips of the wood from the palm leaf they are regularly used by the inhabitants of the Sandwich Islands where the plant is called *kukni* and the torches are reported to burn for hours giving a clear and steady light The yearly production of the *kukni* oil in the Sandwich Islands is said to be 10 000 gallons It is now exported to Europe for candle making and is reported to be equal to gingelly (Sesame) or rape oil *Simmonds* reports that 31½ gallons of the nut yield 10 gallons of oil which bears a good price in the home market It may be obtained either by boiling the bruised seeds or by expression

The oil is very fluid of an amber colour without smell congealing at 32 F insoluble in alcohol readily saponifiable and very strongly drying (*U S Dispens 15th Ed*) The cake after expression of the oil is a good food for cattle and useful as manure (*Drury's Us Pl*) The cake left after the expression of the oil given to a dog in the dose of about half an ounce produced no vomiting but acted strongly as a purgative (*U S Dispens*) These opinions would seem to be rather conflicting

§ The oil makes a capital dressing for ulcers (*Surgeon W Barren Bhuj Cutch Bombay*)

Medicine—The kernels yield on expression a large proportion of a fixed oil which has been pronounced by the Madras Drug Committee

GUM
738DYE.
739OIL.
740MEDICINE
Kernels
741

**ALHAGI
maurorum****The Camel Thorn**

(1855 p 428) to be superior to linseed oil for purposes connected with the arts. Medicinally a dose of about two ounces has been found to act in from three to six hours as a mild purgative its action being unattended with either nausea colic or other ill effects. It approaches castor oil and has been found quite as certain in its action with the advantage of possessing a nutty flavour dose $\frac{1}{2}$ to 1 oz (*Pharmacopæia of India*) Dr Irvine says the nut is a stimulant and sudorific dose $\frac{3}{4}$ to 3i.

Dr Oalixo Oxamendi (*Anales de Medicina de la Habana*) performed a series of experiments by which he arrived at the conclusion that the oil must be administered in much smaller doses than is commonly stated. He found that half an ounce was quite sufficient to move the bowels of an adult. He recommends that it be used as a substitute for other aperients on account of its having a pleasant nut like taste and acting freely in three hours without giving pain or griping. Dr Oxamendi attributes this property not only to the oil itself but to a peculiar resin which irritates the intestinal mucous membrane. He recommends gum arabic to be combined with it and for external application in obstructed constipation he suggests that it should be combined with Tinct of Cantharidis and Ammonium Carbonate. \mathcal{R} . Ol Nucis Aleurites Trilobæ $\frac{1}{2}$ oz Tinct Cantharid and Ammon Carb a a $\frac{3}{4}$ (M Linam).

FOOD
742

Food—It is cultivated for the sake of its fruit which is generally 2 inches in diameter. Roxburgh says The kernels taste very much like fresh walnuts and are reckoned wholesome.

Algarobilla and Algaroba

TAN
743

A tan obtained chiefly in America from certain members of the genus *Prosopis* of which *P pallida* Kunth *P glandulosa* *P dulcis* and *P spicigera* are the most important species. See *Prosopis*.

By some authors **Algaroba** is restricted to the Carob tree *Ceratonia Siliqua*, which see. The *U S Dispensatory 15th Ed* says that **Algarobilla** is the pod of *Balsamocarpion brevifolium* a drug containing 60 to 68 per cent of tannin and a large quantity of ellagic acid but none in the seeds. It is obtained from Chili. Dr R Godeffroy (in *Archiv der Pharm XIV p 449*) regards this as a good source from which to prepare tannin (*Year Book Pharm 1879 215 and 1882 208*).

The word Algaroba is said to be derived either from Algarobo a town in Andalusia or from the Arabic *Al*=the and *Kharroub* the Carob tree. It seems probable that the name is applied to a number of plants the pods of which contain a sweet mucilage—the pods which are alluded to in the Scriptures as the husks or beans.

744

ALHAGI, Desv Gen Pl I 512

A low shrub armed with hard spines $\frac{1}{2}$ -1 inch long belonging to the Natural Order LEGUMINOSÆ. Leaves simple drooping from the base of the spines or branches oblong-obtuse coriaceous glabrous. Flowers 1-6 axillary to a spine on short pedicels. Calyx campanulate glabrous $\frac{1}{2}$ to $\frac{3}{4}$ inch teeth 5, minute. Corolla reddish 3 times the size of the calyx standard broad keel obtuse. Stamens 10 diadelphous anthers uniform. Ovary linear sub-continuous joints small turgid smooth.

The generic name is the Arabic for the plant *Al hagu* pronounced by the Egyptian Arabs *el hagu*.

745

Alhagi maurorum, Desv Fl Br Ind II, 145**THE CAMEL THORN THE PERSIAN MANNA PLANT**

Syn.—*HEDYSARUM ALHAGI* Willd as in Roxb *Fl Ind Ed CBC p 574*.

A 745

The Persian Manna Plant

ALHAGI
maurorum

Vern—*Yum i jamasa* or *jumna a* or *yavda* or *yavsd* or *yavand*
 HIND BOMB *Juwasha* Cutch *Dulal tabhd* *yavasha* BENG *Du*
ralabha girikarnika-yav sa SANS *Shutar-khar* or *uhtar-khar*
khar i shutr PERS *Alhaju* *haj aagul shoukul jamal* ARAB
Girikarnika tella giniya-chettu TEL

The names *Unt kitara* and *unt kitvish* **Moodeen Sheriff** says are sometimes but incorrectly applied to this plant. The *Minna* is known as *Tiranjabin*.

Habitat.—A widely spread shrub of the Ganges valley and of the arid and northern zones. A native of the deserts of South Africa Egypt Arabia, Asia Minor Greece to Beluchistan and Central India the Konkan and the plains of the Upper Ganges and North West Provinces Very common near Delhi.

Properties and Uses—

Medicine—The HERB is cooling and bitter and has antibilious properties. The twigs are often resorted to as a poultice or fumigation for piles. The FLOWERS are also sometimes used for this purpose. The thorny twigs are sold as the medicinal product and the preparation generally used is the extract by evaporation of a decoction of these. This is called *Jatasar-kara*. It is sweetish bitter and is a favourite remedy for the coughs of children. By the Hindus the FRESH JUICE is used as a diuretic in combination with laxatives and aromatics. The expressed juice is applied to opacities of the cornea and is directed to be snuffed up the nose as a remedy for migraine. (*Dymock Mat Med W Ind 179*)

§ The infusion has a diaphoretic action. (*Surgeon W Barren Bhuj Cutch Bombay*)

Oil—The oil prepared with the leaves is used as an external application in rheumatism.

Manna—The Sanskrit writers do not appear to refer to the MANNA or sweet sugary excretion obtained naturally from the plant by shaking its twigs over a cloth. This is chiefly collected in Khorasan Kurdistan and Hamadin and imported into Bombay from November to January. It is called *Taranjabin*. It occurs in small round unequal grains of the size of coriander seed caking together and forming an opaque mass. **Royle** states that the Indian plant does not yield the manna and that the *Tiranjabin* of the bazars is imported into India from Persia and Bokhara (*O Shaughnessy*).

§ I have never observed any manna or sweet sugary excretion on this plant although I have seen it in every stage of its growth in large quantities in all parts of the Panjab and North West Provinces. (*Brigade Surgeon G A Watson Allahabad*). The *Juwasa* trees in the districts of Muzaffernagar Meerut &c on the banks of the Jumna yield *Taranjabin* but only in small quantities. My assistant has seen it growing and has collected the manna in these districts. (*Surgeon Major C W Calthrop M D Morar*).

"The editors of the *Pharmacographia* state that **Alhagi MANNA** is collected near Kandahar and Herat where it is found on the plant at time of flowering. Specimens sent them by **Dr E Benton-Brown** and **Mr T W H Talbot** had the form of roundish hard dry tears varying in size from a mustard seed to that of a hemp seed of a light brown colour and agreeable saccharine senna-like smell. The leaflets spines and pods mixed with the grains of manna are characteristic. It is imported into India from Kabul and Kandahar to the extent of 2000 lbs annually and is valued at 30 shillings per lb. According to **Ludwig** it contains cane-sugar dextrine a sweetish mucilaginous substance and a little starch. (*Surgeon Warden, Prof of Chemistry Calcutta*)

MEDICINE
Flowers and
Herb

746

Poultice

747

Twigs

748

Extract.

749

Fresh Juice.

750

OIL.

751

MANNA

752

ALISMACEÆ

The *Alisma* and *Sagittaria*.

Chemical Composition — According to Villiers Alhagi Manna after being boiled with animal charcoal and evaporated to a syrup crystallized after some months in small brilliant crystals which on crystallization from alcohol formed large white crystals of the formula $C_{12}H_{22}O_{11} + H_2O$. It is dextrorotatory its power being $+94.48'$ or for the sodium flame $+88.51'$. On boiling with an acid it is converted into glucose and its rotatory power is reduced to that of glucose *vis* $+53$. It then reduces Fehlig's solution nitric acid oxidizes it to mucic and oxalic acids. Its melting point is 140 . It is thus seen to be identical with Berthelot's melezitose. It crystallizes in monoclinic (clinorhombic) prisms. The mannite of Alhagi also contains cane sugar which may be isolated by treating the mother liquor of the melezitose with alcohol and adding ether till a slight precipitate is formed. Crystals of cane sugar are then deposited. The mother liquor acts like a solution of cane sugar containing dextrorotatory foreign substances which are not fermentable with beer yeast (*Vide Jour Chem Soc April 1877*) (*Dymock's Mat Med W Ind 180*)

FODDER
(Camel)
753

Fodder — In the hot season when almost all the smaller plants die this puts forth its leaves and flowers which are used as a camel fodder. Just about this time the leaves and branches exude a gummy looking liquid which soon thickens into solid grains these are gathered by shaking the branches and constitute the edible substance known as manna. This secretion however is apparently not found on the Indian plant but is collected at Kandahar and Herat whence small quantities of the manna are imported into Peshawar.

DOMESTIC
USES
Tatties
754

Domestic Uses — The twigs are much used for making the tatties (cooling mats) used in Upper India in the hot season.

ALISMACEÆ

755

Alismaceæ, Gen Pl III 1003 Mono Phanerg DC III 29

A Natural Order of aquatic monocotyledons with radicle sheathing strongly marked leaves. *Flowers* hermaphrodite or monœcious. *Pertianth* 6 merous 2 seriate—a distinct calyx and corolla. *Stamens* hypogynous or perigynous equal to or double the number of the perianth leaflets. *Ovaries* more or less numerous whorled or capitate distinct 1 celled and 1 to 2 ovuled. *Ovules* campylotropous. *Fruit* a follicle. *Seeds* recurved exalbuminous embryo hooked.

This Natural Order has its chief affinity to JUNCAGINEÆ (in the NAIADACEÆ) which only differ in their extrorse anthers anatropous ovules and straight embryo. The BUTOMEÆ are so closely related that they have been reduced to a tribe of the ALISMACEÆ being only separated by their placentation and the number of the ovules.

FOOD
756

Economic Properties — There are 12 genera in this Order ALISMA and SAGITTARIA being the largest and most abundant both of which have representatives in India found in tanks and marshes. Their economic uses are apparently unknown to the natives of India. For some time they enjoyed in Europe the reputation of being useful in the treatment of hydrophobia having been pitched upon by empirics. The rhizomes are however largely eaten in many parts of the world. In China *Sagittaria chinensis* is cultivated as an article of food and so also in North America is *S. obtusifolia*. In India *S. sagittifolia* is found in every tank throughout the plains and by desiccation the rhizomes of this species lose their acidity in this condition they are eaten by the Tartar Kalmucks. Apparently the natives of India are ignorant of this property and it would appear that great advantage might be taken of the edible rhizomes of *Sagittaria* in times of famine (See *Sagittaria*).

A. 756

Alkanet

ALLAMANDA.

Alisma Plantago, Linn

Common in tanks in Bengal also in marshes and lakes it extends throughout the Himalaya to Kashmir

757

ALKALINE ASHES**Alkalis, or Alkaline Ashes, or Pearl-Ash**

758

759

The ash produced by the incineration of plants may be referred to many classes each characterised by the prevailing constituent present. Amongst these may be mentioned pearl ash or alkaline earths these contain potash. Barilla is a vegetable ash containing soda salts. Kelp bromine and iodine ash. Silicon is also frequently present especially in the ash of graminaceous plants and so also is lime in others. The first three are those of commercial importance. The following are the chief plants which yield pearl ash in India —

Abrus precatorius
Achyranthes aspera
Adhatoda Vasica.
Alstonia scholaris
Amarantus spinosa
Anthrocnemum indicum
Bamboo ash
Borassus flabelliformis
Butea frondosa
Caesalpinia Bonducella
Caroxylon foetidum
C Griffithii
Calotropis gigantea.
Cassia Fistula.
Cedrus Deodara
Euphorbia neruifolia
E Tirucalli

Erythrina indica
Gmelina arborea
Holarrhena antidysenterica.
Indigofera tinctoria
Luffa ægyptiaca
Musa sapientum.
Nerium odorum
Penicillaria spicata
Plumbago zeylanica
Pongamia glabra
Shorea robusta.
Stereospermum suaveolens
Succa indica
S nudiflora
Symplocos racemosa.
Vallaris dichotoma
Vitex Negundo

These salts are largely used in India as mordants but rarely in a pure form

Of minerals alum and *sajji mati* (an impure carbonate of soda, found as a natural earth) are those most used (See **Auxiliaries Dye**)

ALKANET

760

Alkanet, said to be derived from *al kanna* a dye supposed originally to mean the *henna* dye or **Lawsonia alba**. It is now restricted to the root of **Anchusa tinctoria** of China a red dye much used in colouring liquids. The Alkanet of Sikkim is obtained from **Onosma Hookeri** Clark (which see). Dr Dymock informs me that a root is imported from Afghanistan as an alkanet which he thinks may prove a species of **ARNFEBIA Alkanna tinctoria**, *Tausch* grows on sandy places on the Mediterranean coast

ALLAMANDA, Linn , Gen Pl II, 690

761

A handsome genus of climbing **APOCYNACEÆ** there are 12 species chiefly inhabitants of Brazil and other parts of South America. They have been introduced and form much prized additions to the flower gardens of India

A 761

**ALLIUM
ascalonicum****The Shallot.****762****Allamanda cathartica, Linn**

Syns & References—A AUBLETII Rohl DC Prod VIII 318 Dymock
Mat Med W India p 421

Vern—*Jaharî sontakkâ pûli kanher pili kaner* BOMB

Habitat—A large yellow flowered shrub from America much cultivated in India and run wild in the tidal back waters of the western coast (Beddome)

Botanic Diagnosis—This is the species most frequently seen in Indian gardens The leaves are in fours oblong lanceolate the flowers at the extremities of long trailing branches tube 1 inch long and the bell shaped portion 2 inches long This is a native of Guiana it flowers freely in Calcutta gardens during the hot and rainy seasons

Medicine—Dr Dymock remarks Though not used in India it has a medicinal reputation the leaves being considered a valuable cathartic in moderate doses Ainslie (Mat Ind II 9) says that the Dutch consider an infusion of the leaves as a valuable cathartic

A Schottii, a native of Brazil is even a still more showy species having much larger flowers with an extra tooth between the petals **A neruifolia**, another Brazilian species is much more compact and shrubby with broader leaves The flowers are deep yellow streaked with orange occurring in dense panicles **A violacea** has reddish violet flowers (Treasury of Botany) Firminger says that he has never seen the *Alla mandas* produce seed in India but that they are all easily propagated by cuttings

MEDICINE
Leaves
763

764**ALLÆANTHUS, Thwaites Gen Pl, III 361****Allæanthus Zeylanicus, Thw URTICACEÆ**

Vern—*Allandoo-gass* CINGH

Habitat—A tree met with in the central province of Ceylon altitude 1 000 to 2 000 feet

FIBRE
765

Fibre—A very tough fibre is obtained from the inner bark of this tree which is used by the Cinghalese for a variety of purposes (Thwaites Enumeratio Plantarum Zeylanicæ p 263)

Allmania, see *Amarantaceæ*

766**ALLIUM, Linn Gen Pl, III, 802**

A genus of bulbous herbaceous plants belonging to the Natural Order LILIACEÆ containing some 50 species confined to Europe and the temperate and extra tropical regions of Africa Asia and America

Bulb tunicated *Spathæ* many flowered *Umbels* crowded *Flowers* regular 6 merous *segments* distinct or only slightly united below *Stamens* 6 *anthers* oblong attached by the middle and on the back *Ovary* superior sessile 3 celled *stigma* 3 fid *ovules* mostly 2 in each cell

Allium is the classical name for the garlic leek &c

767**Allium ascalonicum, Linn Roxb Fl Ind C B C Ed, 288**

THE SHALLOT

Vern—*Candhan gandana* PB *Gandana* SAHARANPUR N W P
Gandana AFG *Gundhun* BENG

Roxburgh gives this species the vernacular name of *peea* but this would seem to be a mistake The specific name is in honour of the ancient city of Ascalon, where Pichard the First King of England defeated Saladin's army in 1192

Habitat—A hardy bulbous perennial native of Ascalon in Palestine Has been cultivated from the remotest times by all the nations of

A 767

The Onion

ALLIUM
Cepa

the East entering largely into their diet. It is regarded as much milder than garlic. It was most probably introduced into England about the middle of the sixteenth century (*Treasury of Botany*). Flowers greenish white or purplish white. Bulbs about the size of a nut, white.

Food—The bulbs separate into what are termed cloves like those of garlic and are used for culinary purposes being of milder flavour than the onion. They also make excellent pickle. It is cultivated apparently in Afghanistan for the sake of the leaves which may be cut two or three times a year for 25 or 30 years. **Firminger** says that it is little known to Europeans in India but that the cloves or small bulbs should be planted out in October about 6 inches asunder and that by the beginning of the hot season the crop will be ready for use. **Balfour** recommends that it should be sown in the commencement of the rains in beds and propagated by dividing the roots. It will yield a crop in the cold season.

FOOD
The Cloves
768

Allium Cepa, Linn. *Roxb Fl Ind C B C Ed 287*

769

THE ONION Eng OIGNON Fr ZWIEBEL Ger

Vern.—*Piyas* HIND, *Piyas palandu* BENG, *Piyis* ASS, *Piy* SANT, *Palandu* SANS, *Basl* ARAB, *I yas* PERS, *Dungari* GUJ, *SIND*, *Kanda* PIYAS BOMB, *K naa* MAR, *K ndi* CUTCH, *Vella ven* GAYAM, *irulli ira-veng y am* TAM, *Vulli gaddalu nirulli* TEL, *Ve igayam nirulli kunbali* KAN, *Lawang* MAL, *Lunu* SINGH, *Ky et thwon ni* sun ni BURM.

References—*Bentley and Trimen Med Pl p 280*, *Moodeen Sheriff s Supp to Pharm of India p 37*, *Baden Powell Punjab Products I p 381*.

Dr Moodeen Sheriff says that in some Indian languages the same names are applied to the onion as to the garlic, the latter being called the white onion—a name very easily confused with the names applied to the white forms of the true onion. *Kandé* is the HIND for squill; it very much resembles the MAR *kandé* for this plant.

Habitat.—Cultivated all over India. There are in Bengal two forms known as the Patna and the Bombay; the onions of Janjira, Bombay, are much prized, being small and white (*Bomb Gaz XI 425*). English seed does not as a rule succeed so well as country because before it can come to India in time for the Indian season it is two years old. Onion seed will not keep for certain more than one year. **Firminger** recommends that selected bulbs be planted and seed obtained from these. If planted in the cold season they will seed about the beginning of the hot season and if carefully preserved after being well ripened and dry the seed obtained in this way will be found to yield a good crop in the following cold season from October to February.

Chemical Composition—**Fourcroy** and **Vauquelin** obtained from the onion a volatile oil containing sulphur, albumen, much uncrystallizable sugar and mucilage, phosphoric acid both free and combined with lime, citrate of lime and lignin. The expressed juice is susceptible of vinous fermentation. The oil is essentially the same as that from *A sativum*, consisting chiefly of allyl sulphide ($C_3H_5)_2S$ (*U S Dispens, 15th Ed*).

Medicine—The bulbs contain an acrid volatile oil which acts as a stimulant, diuretic and expectorant. Onions are occasionally used in fever, dropsy, catarrh and chronic bronchitis, in colic and scurvy, externally as rubefacients and when roasted as a poultice. Considered by the natives hot and pungent, useful in flatulency. Said to prevent the approach of snakes and venomous reptiles (*Baden Powell*).

They are also described as aphrodisiac and carminative. Eaten raw they are emmenagogue. The juice rubbed on insect bites is said to allay

MEDICINE.
The Bulb
770

A 770

**ALLIUM
Cepa.****The Onion****Juice
771**

irritation the centre portion of a bulb heated and put into the ear is a good remedy for earache. The warm juice of the fresh bulb is also used for this purpose. In addition to the oil obtained from the bulbs the seeds yield a colourless clear oil used in medicines.

Opinions of Medical Officers—§ The bulb is crushed and the acrid smell emitted is utilised like smelling salts for fainting and hysterical fits. (*Surgeon Major Robb Ahmedabad*) Said to increase the peristaltic action of the intestines and is prescribed in obstruction. Used by natives in jaundice hæmorrhoids and prolapsus ani also in hydrophobia. As an external application onions are used in scorpion bite and to allay irritation in skin diseases. They have antiperiodic properties attributed to them and are said to mitigate cough in phthisis and mixed with vinegar are used in sore throat. (*Surgeon F McConaghey Shah jahanpore*) Used as decoction in cough. (*Surgeon G C Ross Delhi*)

Onion juice mixed with mustard oil in equal proportions is used as a liniment to allay rheumatic pains. The bulbs made into a necklace are worn as a charm to ward off the attack of cholera and frequently kept suspended in front of the entrance to houses. (*Asst Surgeon Anund Chunder Mukerji Noakhally*) The onion promotes appetite and sexual desire it acts also as a deodoriser and is employed to correct the ill effects of the atmosphere when cholera or any other epidemic disease is prevailing. Eaten raw it acts as a diuretic and emmenagogue. Cooked with vinegar it has been employed with benefit in cases of jaundice enlargement of the spleen and dyspepsia. The fresh juice is said to be a useful local application in cases of the bite of mad dogs its internal exhibition at the same time accelerates the recovery. In scorpion bite it has attributed to it the same properties. (*Asst Surgeon Gholam Nabi Peshawar*)

I have found the onion very useful in preserving natives from scurvy. (*Surgeon L Cameron Nuddea*) The juice of the bulb in 3iv to 3viii doses mixed with about 3ii of sugar is a capital remedy for bleeding piles one dose a day. (*Asst Surgeon Nundo Lal Ghose Bankipur*) A medium sized onion is eaten twice a day with two or three black peppercorns as a favourite remedy in malarial fevers a decoction of onion is used in cases of strangury. (*Surgeon Major John North Bangalore*) Upon the cut surface of a large onion a little slaked lime is placed this rubbed over the part stung by a scorpion gives immediate relief. (*Surgeon Major D R Thompson Madras*)

Soporific when eaten raw. The juice is an excellent stimulant in cases of faintness it should be applied freely to the nostrils. Is also used locally for the cure of scorpion bites. It is said that the aphrodisiac properties of onions are enhanced by preserving them in a well stoppered pot and then permitting the latter to remain in a cowdung yard for a period of four months. One onion treated after this method is said to produce strong aphrodisiac effects. (*Surgeon W Barren Bhuj Cutch Bombay*)

The natives use this largely in cases of dysentery. It is prescribed thus a grain of opium is buried in a bulb and this is roasted under hot ashes and is then administered to a patient suffering from acute dysentery. Good success follows this mode of treatment. Three ordinary sized bulbs with a handful of the leaves of the *Tamarindus indicus*, is made into a paste and used as a purgative. (*Surgeon Lee Mangalore*)

Fresh juice of the bulbs rubbed on the body in case of sunstroke is attended with apparent benefit. A popular embrocation with the natives of Upper India, where in the hot season parents hang a number of onions on the chests of their children as a safeguard against hot winds. Roasted

| The Leek | ALLIUM Porum. |
|--|---|
| <p>they are commonly given to children as a stomachic (<i>Asst Surgeon Shri Chunder Bhattacharya; Chanda Central Provinces</i>)</p> <p>Food—The onion is cultivated very extensively all over India especially in the neighbourhood of large towns and is consumed both by Europeans and natives. The Mussulmans of India never cook curry without onions but the strict Hindus of Bengal regard them as objectionable and rarely if ever eat them. The Patna onion is of a superior kind and is much sold in the Calcutta markets. The onions of the northern provinces are larger and more succulent than those of Bengal and the southern provinces. Deprived of its essential oil by boiling the onion becomes a mild esculent.</p> <p>Onions leeks and garlic were cultivated in Egypt in the time of Moses and Herodotus (B C 413) mentions an inscription stating that 1 600 talents equal to £428 800 were paid for the onions and garlic eaten by the workmen engaged upon the erection of the great pyramid.</p> <p>§ When pre sure of work or any other cause prevents the cooking of curry the natives frequently eat onions with their daily meal which in the case of the poorer Bengalis is stale rice and water with salt and with the natives of Upper India coarse bread. The onion in these cases is eaten raw for the purpose apparently of flavouring the meal (<i>Mr L Liotard</i>)</p> | <p>FOOD 772</p> |
| <p>Allium fistulosum, Linn</p> <p>THE WELSH ONION, ROCK ONION STONE LEEK</p> <p>A native of Siberia said to have been introduced into Europe in 1629. Cultivated in gardens but not admired as a culinary vegetable. It is a strong rooted perennial plant with sharp pointed leaves a foot or more in length. It never forms a bulb like the true onion but has long tapering roots. From being very hardy it is generally sown to supply early onions for salad (<i>Smith's Dictionary</i>)</p> | <p>773</p> |
| <p>A leptophyllum, Wall</p> <p>THE HIMALAYAN ONION</p> <p>The bulbs are regarded as sudorific they are said to have a stronger pungency than ordinary onions. The leaves form a good condiment. Is this the species said to be exported from Lahoul?</p> | <p>774</p> |
| <p>A Porum, Willd Roxb Fl Ind, C B C Ed, 287</p> <p>THE LEEK</p> <p>Vern.—<i>Kirāth</i> or <i>Kiras</i> ARAB <i>Paru</i> BENG <i>Tan kyet thoon</i> BURM (<i>Balfour</i>)</p> <p>This esculent plant has been known from time immemorial. According to some authors it was originally a native of Switzerland but more probably like the onion it came from the East. It is mentioned in the sacred writings and was cultivated by the Egyptians in the time of Pharaoh. Pliny says leeks were brought into notice by the Emperor Nero. The leek has been the badge of Welshmen ever since the sixth century and is worn on St David's day in commemoration of a victory they had over the Saxons when they were instructed to wear the leek as a distinguishing badge during the battle (<i>Treasury of Botany</i>).</p> <p>Firminger says leeks are best propagated in India by sowing the seed broadcast on a small bed immediately the rains stop. When the seedlings are about six inches high they should be carefully transplanted taking care not to injure the roots. They should then be planted in rows</p> | <p>775</p> <p>FOOD 776</p> |
| <p>A. 776</p> | |

**ALLIUM
sativum.****The Garlic**

six inches apart They require plenty of water and should be earthed up once or twice

777

Allium Rubellum, Bieb

Vern—*Ṣangli piās barani piās chirī piās* HIND

Habitat—Slender leaved species common in North West Himālaya extending into Lahoul

Food—The root is eaten raw or cooked

FOOD

778

A sativum, Linn Roxb, Fl Ind C B C Ed 287

779

THE GARLIC

Vern—*Lasan* or *lahsan* HIND *Rasun* or *lasun* or *lashan* BENG ; *Naharu* ASS *Rasun* SANT *Maha ushadha lasuna* SANS *Sum* ARAB *Sir PERS* *Lasunas* MAR *Lasan* GUJ *Shunam* DUK *Vallar pundu* TAM *Vellulli tella gadda* TEL *Belluli* KAN *Gokpas* BHOTE *Samsak* TURKI *Kyat thou bega kesum phuu kyet thwunbya* BURM *Sudu lunu* CINGH

References—*Bentley & Trimen Med Pl 280 U S Dispens 15th Ed Supp to Pharm of India p 38 Treasury of Botany Pt 1 p 39 Watt's Dictionary of Chemistry Vol 1 p 143 Sharp in Proc Amer Pharm Association for 1864*

Habitat—Cultivated all over India **Firminger** says it is very much cultivated by the natives in most parts of India and can be had cheap at any bazar

It is propagated by planting out the cloves singly in October in drills about 7 inches apart and 2 or 3 inches deep The crop is taken up in the hot weather and after being dried in the sun the BULBS are stored for future use

Botanic Diagnosis—*Bulbs* numerous enclosed in a common membranous covering *Stem* simple about 2 feet in height *Leaves* long flat acute sheathing the lower half of the stem *Scape* smooth and shining solid terminated by a membranous pointed spathe enclosing a mass of flowers and solid bulbils and prolonged into leafy points *Flowers* small white

Chemical Composition—§ Allylic sulphide is the chief constituent of the oil obtained by the distillation of garlic with water it also occurs but to a smaller extent in oil of onions From the herb and seeds of the *Thlaspi arvense*, it can also be obtained together with sulphocyanide of allyl and oil of mustard The leaves of the *Sisymbrium Alliaria* yield oil of garlic and the seeds oil of mustard A mixture of these two oils is likewise yielded by the following *Capsella Bursa pastoris* *Raphanus Raphanistrum* and *Nasturtium* In some cases the oils do not exist ready formed for example the seeds of *Thlaspi arvense* emit no odour when bruised and they must be macerated in water some time before distillation (*Watts*) Allylic sulphide is a colourless oil of sharp unpleasant odour lighter than water The crude oil has a most intense odour of garlic (*Surgeon Warden Prof of Chemistry Medical College Calcutta*)

Properties and Uses—

Oil—The seeds yield a medicinal oil clear colourless and limpid **Dr Ainslie** remarks that an expressed oil is prepared from the garlic which is called *Vallay pundu unnay* it is of a stimulating nature and the *Vytians* prescribe it internally to prevent the recurrence of the cold fits of intermittent fever externally it is used in paralytic and rheumatic affections (*Cooke*)

Medicine—As a medicine garlic was held in great repute by the ancient physicians and was also formerly much used in modern practice but in this country it is now rarely prescribed by the regular practitioner

OIL
780MEDICINE
781**A 781**

Opinions of Medical Officers.

ALLIUM
sativum.

MEDICINE.

although it is still employed to some extent in the United States Garlic is stimulant diaphoretic expectorant diuretic and tonic when exhibited internally and rubefacient when applied externally It is also regarded by some as anthelmintic and emmenagogue (*Bent & Trim Med Plants 280*)

In India Garlic is considered hot and aperient given in fevers coughs piles leprosy being regarded as carminative diuretic stomachic alterative emmenagogue and tonic and much used by the natives in nervous affections It is esteemed by the Hindus as a remedy in intermittent fevers The bulb is given in confection for rheumatism Externally the juice is applied to the ears for deafness and pain Garlic is in fact chiefly employed at the present day as an external remedy it is resolvent in indolent tumours Is largely used as a liniment in infantile convulsions and other nervous and spasmodic affections It is also frequently used as a poultice as for example in retention of the urine from debility of the bladder

The properties of garlic depend upon a volatile oil which may readily be obtained by distilling the bruised bulbs When purified this oil is colourless and may be distilled without decomposition When garlic has been eaten the odour of the oil may be detected in the various secretions of the body

Opinions of Medical Officers — § Mixed with vinegar garlic is used as an astringent in relaxed sore throat and relaxation of the vocal chords It is also used in asthma general paralysis facial paralysis gout and sciatica is much thought of in the treatment of flatulent colic Supposed to prevent the hair turning grey when applied externally (*Surgeon G A Emerson Calcutta*) Eaten in its green condition by persons in the cold season from an idea that it wards off attacks of rheumatism and neuralgia (*Surgeon Major F Robb Ahmedabad*) Sometimes used for blistering purposes but takes a long time before having any effect (*Surgeon Major C F McKenna Cawnpore*) Garlic is an excellent medicine in several forms of atonic dyspepsia It appears like onions to be useful in keeping up the temperature of the body It is a good antispasmodic In bronchial and asthmatic complaints it is decidedly beneficial (*Surgeon Major R L Dutt M D Pubna*) Mustard oil in which garlic has been fried is an excellent application for scabies and for maggots infesting ulcers (*Assistant Surgeon Nobin Chunder Dutt Durbhunga*) The juice or the whole bulb is used with salt as a poultice in bruises and sprains also in neuralgia rheumatism gout and rheumatoid arthritis and to relieve earache (*Brigade Surgeon F H Thornton Monghyr*) The smell of garlic is said to kill snakes they never come where it is kept Garlic poultice is used for rheumatic pains and also in neuralgia if kept long it is rubefacient Garlic oil is stimulant and rubefacient largely used in the bronchitis of children (*Asst Surgeon F N Dey Feypore*)

A clove or two of garlic boiled in half an ounce of gingelly oil (*Sesamum*) and used as an ear drop in atonic deafness has proved very successful in my practice The juice in elongated uvula is used with the same effect as that of nitrate of silver (*Honorary Surgeon Easton Alfred Morris Negapatam*) A necklet of the bulbs is worn by children suffering from whooping cough The juice is sometimes given with hot water for asthma (*Surgeon James McConaghey Poona*)

"The expressed juice is a common application as a rubefacient (*Native Surgeon Ruthnam T Moodelliar Chingleput Madras*) Expressed oil used for elongated uvula is said to act better than nitarg (*Surgeon Major F F L Ratton M D Salem*)

**ALLIUM
tuberosum****Chives and Rocambole****MEDICINE**

Habitually eaten by many persons subject to rheumatism. Coconut or mustard oil in which a few pieces of garlic have been boiled is useful in scabies and other parasitic skin diseases. (*Assistant Surgeon Shib Chunder Bhattacharya Chanda Central Province*) The juice is used by the natives to destroy lice. It also acts as a blister and as such is frequently used by native practitioners. (*Surgeon S H Browne Hoshangabad Central Provinces*)

The bulb is washed and applied to the temples and acting as a counter irritant has been known to relieve severe hemicrania and other forms of headache. (*Surgeon Major A S G Jayakar Muskat Arabia*)

FOOD**782**

Food—Used as a condiment in native curries throughout the country.
§ The bulbs of garlic are eaten almost daily by the natives. (*Brigade Surgeon G A Watson Allahabad*)

783**Allium Schoenoprasum, Linn****CHIVES OR CIVIS**

A cultivated pot herb allied to garlic with purple flowers a native of North Europe. Its hollow grass like leaves forming clustered tufts are commonly seen in kitchen gardens in Scotland. It is indigenous to Great Britain and is accordingly very hardy standing repeated cutting off close to the ground the leaves are used in salad and to flavour soup. *Firminger* says it is little known in India but is propagated by division of the roots in October.

784**A scorodosprasmum, Linn****THE ROCAMBOLE**

A perennial esculent lily closely allied to garlic but regarded as much milder in flavour. It is a native of Denmark and other parts of Europe it is used in the same way as garlic and the shallot but its small cloves are considered more delicately flavoured than either.

785**A sphærocephalum, Linn**

Grows wild in Lahoul.

The root and dried leaves are eaten. (*Stewart*)

786**A tuberosum, Roxb Fl Ind Ed C B C 287**

Vern—*Bunga ghundeena* BENG

Roxburgh says of this plant. The natives use it as an article of diet as leeks are used in Europe. *Royle* simply refers to this as a plant collected by *Roxburgh*. There seems to be some mistake regarding it however for it appears not to have been collected since *Roxburgh's* time and even *Voigt* in his *Hortus Suburb Calc* says this is unknown to us as well as to our oldest native gardeners who have hitherto been unsuccessful in their endeavours to procure it from the neighbourhood of the Calcutta Botanic Gardens where *Roxburgh* most probably collected the plant.

The greatest possible confusion exists in India regarding the cultivated forms and indeed regarding even the wild forms of the genus *Allium* and it is probable that in addition to all the preceding forms many others are regularly known to the natives of India, and even cultivated and sold in our bazars. *Stewart* enumerates the following unknown species as met with on the Panjab Himalaya *A sp* (? *odorum*)—vern in Jhelum valley.

A 786

Pimento

ALNUS
dioica.

bhuk in Ladák *skodse* **A** sp—vern *Jhelum khan* Spiti *phundu*
A sp—vern *kiur* in the Ravi Valley and *kosse gokpa* in Ladák **Stewart**
 also says that an unknown species is exported from Lahoul to Kullú to be
 eaten as a condiment by Hindus (See **A** *leptophyllum*)

ALLOPHYLLUS, *Linn* According to *Gen Pl I*, 396,
 reduced to *Schmidelia*

Allophyllus Cobbe, *Bl Fl Br Ind I* 673 SAPINDACEÆ

Syn —ORNITROPHE COBBE *Willd Roxb Fl Ind Ed C B C* 328

SCHMIDELIA COBBE *Beddome lxxiii*

Vern —*Thaukyot* BURM

Habitat —A deciduous shrub of East Bengal South India Burma
 and the Andaman Islands

Structure of the Wood —Grey soft

787

TIMBER
788

ALLSPICE

Allspice or Pimento —A small bush or tree *Pimenta acris* *Wight and*
P officinalis *Linn* MYRTACEÆ

Habitat —Native of the West Indies *Oleghorn* reports that several
 trees are in Madras but that the climate of the Carnatic does not seem to
 suit them *Mason* states that this large tree is repeatedly met with in
 Lavoij but it does not flower he is probably mistaken as the plant is a
 small tree

It is much cultivated in the West Indies for the sake of its aromatic
 leaves and berries They partake of the smell and flavour of the cinna-
 mon clove and nutmeg Largely cultivated in Jamaica in what are
 known as pimento-walks The berries are highly spoken of as a substitute
 for tobacco and are said to be very pleasant but require to be smoked in
 a long pipe They are also used as a spice to flavour food An oil is
 obtained by distillation equal to nutmeg oil reputed to allay tooth ache
 The bruised berries are carminative stimulating the stomach and pro-
 moting digestion they also relieve flatulency *P acris* is regarded as
 inferior to *P officinalis*

789

Almonds, Bitter and Sweet see *Prunus Amygdalus* *Bail* ROSACEÆ

Almonds, Country, see *Terminalia Catappa*, *Linn* COMBRETACEÆ

ALNUS, *Gärtn Gen Pl III* 404

790

A genus of trees belonging to the tribe BETULÆ of the Natural Order
 CUPULIFERÆ a tribe which formerly was viewed as a Natural Order The
 genus contains some 14 species inhabitants of Europe temperate Asia, and
 America chiefly delighting in a moist soil and most of them preferring the
 northern or alpine regions to the warm southern tracts of the temperate
 zones

Leaves alternate deciduous rounded blunt serrate penninerved and
 furnished with tufts of whitish down in the angles of the veins beneath
Flowers monœcious *male catkins* long pendulous appearing in autumn
stamens 4 *female spikes* ovate cone like appearing in spring after fructi-
 fication the thickened scales of the cone open and allow the seeds to escape
 the cone like bodies remaining attached to the tree until next year Com-
 pare with the 2 stamened condition of BETULA with its caducous cones

Alnus dioica, *Roxb Fl Ind, Ed C B C*, 658

A Euphorbiaceous plant. **Syn** for **Aporosa dioica**, *Mull Arg* which see

A. 790

**ALNUS
nepalensis****The Nepal Alder****791****Alnus glutinosa**, Linn Brandis, *For Fl*, 461 Hooker's *Students Fl* 346

THE ENGLISH ALDER, SCHWARZERLE, Ger AUNE GLUTINEUX, Fr ONTANONERO It

Habitat —The English alder has apparently not been introduced into India*Properties and Uses—***Dye and Tan** —The bark is used in dyeing and tanning It contains about 20 per cent of a peculiar tannin**Medicine** —The bark and the leaves are very astringent and somewhat bitter The former has been used in intermittent fever and the latter as an external remedy in the treatment of wounds and ulcers Bruised leaves are also sometimes applied to the breasts with the object of arresting the milk A decoction of the cones is used as a gargle**Structure of the Wood** —White soft and light on exposure to air turning pale red will decompose in a year if exposed alternately to wet and dry weather but if buried in the ground or submerged in water no wood is more durable There is no heartwood Knotty trees often yield beautifully mottled wood The alder is the badge of the Clan Chisholm The wood furnishes the best charcoal for gunpowder Used extensively in Europe for herring barrels

The following are indigenous species —

797**A. nepalensis**, D Don Brandis *For Fl*, 460 Wall, *Pl As Rar* t 131**THE NEPAL ALDER****Vern** —Kohi Kæ Pb Udish KUMAON Udis udish wusta N W P Udis utis (Gamble) boshi swa (Brandis) (NEPAL Kowal LEPCHA**Habitat** —A tall sparsely branched deciduous tree whose leaves soon become completely perforated by insects It occurs from the Ravi eastward between 3 000 and 9 000 feet in altitude extending eastward to the Khavja and Naga Hills (Watt) and to the Kakhien hills in Ava (Aurs)**Botanic Diagnosis** —The tree is easily recognised by its dark green coloured bark in young trees becoming brown and fissured with age Leaves oblong to elliptic on a slender petiole obtuse at the base shortly acuminate Catkins sessile cones ovoid shortly stalked Nuts irregular winged often broadest at the apex Fruit ripe in March*Properties and Uses—***Dye** —The bark is used for dyeing and tanning By the Nagas and Manipuris it is used in combination with *Rubia sikkimensis* and *R. cordifolia* to deepen the colour See *Rubia* The bark is used in tanning and dyeing It is also said to enter into the composition of native red inks (Madden)**Oil** —Said to yield an oil resembling birch oil**Structure of the Wood** —Similar to that of *A. nitida*, but the pores are fewer and somewhat larger and the medullary rays are broad and very numerous Weight 27 to 28 lbs per cubic foot

It is used for tea boxes in Darjeeling

This is perhaps one of the commonest plants in North Manipur and the Nagá Hills extending into the mountains of North Burma It is rare in Manipur proper owing to the prevalence of dry red clay Every moist soil and river bank in the region indicated from 2 000 to 8 000 feet in altitude is however full of it and so also are some portions of the country to the south and west of the valley of Manipur, extending into the

DYE & TAN
The Bark**792****MEDICINE**
The Bark**793**

The Leaves

794

Cones

795**TIMBER****796****DYE****798****OIL****799****TIMBER****800****A 800**

The Alocasia.

ALOCASIA
fornicatum.

Northern Cachar hills It might be propagated to an unlimited extent and not only supply timber and fuel but its bark might easily form an article of internal trade How far it might prove practicable to extend the cultivation of this useful tree into the tea districts of Cachar Sylhet and Assam remains to be proved but if not already attempted it seems worthy of a trial It grows rapidly stands being pollarded freely and if not propagated for its light soft wood for tea boxes would form a valuable source of fuel luxuriating in the damp uncultivable banks of rocky streams and river beds

Alnus nitida, Endl Brandis For Fl, 460 Gamble, Man Timb, 373

801

Vern—Shrol sarohi sawali silein rikunra ch p chámé tsápu or chápu
piak kunsh kunsu kunich nu kosh hoe rajain kundash PB Paya
udesh KUMAON Gira ghushbe AFG

Habitat—A large tree 80 to 100 feet in height met with in the Pánjab Himálaya ascending from 1 000 feet to 9 000 feet in altitude Brandis says the largest trees are seen in the basins of the Jhelum and Chenab

Properties and Uses—

Dye—The bark is used for dyeing and tanning

Fibre—The young twigs are used for tying loads rope bridges &c, and in the construction of baskets

Fodder—Leaves are sometimes used as fodder

Structure of the Wood—Reddish white soft close and even grained tough to cut annual rings distinctly marked by harder wood near the inner edge of each ring

Used for bedsteads and for the hooked sticks of rope bridges

DYE AND
TAN
The Bark
802
FIBRE
803
FODDER
804
TIMBER
805

The Indian Alders do not seem to possess in the same degree at least the properties of the English and American species It is probable however that their properties are only unknown and that they require to be made known in order to take an important place amongst the indigenous products of the country The bark of several alders is of great medicinal value and a decoction will give to cloth saturated with lye an indelible orange colour (*Porcher*) It contains a peculiar tannic principle American alder has come into use for tanning it renders skins particularly firm mellow and well coloured (*Easton*) The bark contains 36 per cent of tannin (*Muspratt*) (*Baron F Von Mueller Extra Trop Plants*)

ALOCASIA, Schott Gen Pl, III 975 Mono Phaner DC II 497

806

A genus of herbs belonging to the AROIDEÆ in the tribe COLOCASIEÆ containing about 20 species, inhabitants of the tropics in Asia and the Malayan Archipelago Tall herbs, with a succulent sub-erect stem marked with scars Leaves the younger all peltate the older sagittate-cordate the petiole elongated and possessed of a well-developed sheath Peduncles often numerous and pointing upwards Spathe tube naked ovoid or oblong convolute accrescent and persistent Spadix inappendiculate Flowers the upper male the lower female Persanth absent Ovary 1 locular or at the apex 3 4 locular ovules few orthotropous erect from a basilar placenta micropyle on the apex.

Alocasia cucullatum, Schott Syn —ARUM CUCULLATUM Lour
A native of Bengal

807

A fornicatum, Schott Syn —ARUM FORNICATUM Roxb
Used medicinally (*Roxb, Fl Ind Ed C B C 626*)

808

W

A. 808

**ALOCASIA
rapiformis****The Alocasia.****809****Alocasia indica, Schott****Syn**—*ARUM INDICUM* as in *Roxb Fl Ind*, Ed C B C 625 A INDICUM *Roxb in Wight Ic III t 794***Vern.**—*Mankanda*, HIND *Mankachu* BENG ASS. *Mánaka* SANS *Alu* MAR**Habitat.**—Generally cultivated around the huts of the poorer classes in Bengal its large leaves forming a striking feature of such localities**Properties and Uses—****Food**—Its esculent stems and root stocks are eaten in curries by people of all ranks It is in fact an important article of food in Bengal the edible stems often 2 or 3 feet in length may be preserved for months**Medicine**—Said to be useful in anasarca the flour obtained by pounding the dried stems is boiled along with rice flour until all the water has evaporated and is given to the patient no other food being allowed (Compare with *Colocasia antiquorum*)**Opinions of Medical Officers**—§ I have never used it solely as a medicine but as food taken frequently it seems to act as a mild laxative and diuretic In piles and habitual constipation it is useful Plants grown in loose soils and ash pits are best The tough portions should be rejected and the stems and root stocks boiled and the water thrown away otherwise they are likely to irritate the throat and palate (*Surgeon D Basu Faridpur*) The flour of old dried stems is a valuable article of food for invalids It is an excellent substitute for arrowroot and sago in place of which I have used it in many instances' (*Assistant Surgeon Shib Chunder Bhattacharji Chanda Central Provinces*)The starch contained in the edible stem seems much more easily digestible than rice and in the milk treatment of cases of malarious saturation with anasarca I have found this root useful to accustom the patient to return to starchy food It has no medicinal virtue I have used it extensively in the Rungpur Jail (*Surgeon K D Ghose Khulna*) *Man kuchu* is a very agreeable vegetable in the convalescence of natives from bowel complaints It is light and nutritious and somewhat mucilaginous I prescribe it often in such cases The root stock is decorated and cut in small pieces and boiled in water It is then mixed with *brinjal* or some other vegetable and made into a curry with a little turmeric and salt (*Surgeon Major R L Dutt M D Pubna*) The root stocks are largely used for patients they are juicy and easily digestible' (*Surgeon Major E C Bensley Rajshahye*) The ash of the root stocks mixed with honey is used in cases of aphthæ (*Assistant Surgeon Anund Chunder Mukerji Noakhally*)**812****A. montana, Schott****Syn.**—*ARUM MONTANUM* *Roxb*The natives of the Northern Circars use the roots to poison tigers (*Roxb Ed C B C, 652*)**813****A. odora, C Kock****Syn**—*ARUM ODORUM* *Roxb*

Flowers are fragrant

814**A. rapiformis, Schott****Syn**—*ARUM RAPIFORME* *Roxb*

A native of Pegu

A. 814**FOOD
810****MEDICINE
811**

History of the Drug Aloes.

ALOE

ALOE, Linn Gen Pl III 776 *

815

A genus of plants with thick succulent and spiny leaves belonging to the Natural Order LILIACEÆ and comprising some 30 species chiefly inhabitants of Africa more particularly of South Africa and the Island of Socotra now cultivated in all tropical and extra tropical countries

Stem absent or short erect or arborescent and sometimes even branched
Leaves succulent forming a rosette on the extremity of the stem often spinous at the apex and sparsely pinously serrate on the margin *Flowers* forming spikes axillary in the uppermost leaves or terminal nodding cylindrical connivent by the short teeth *Stamens* 6 hypogynous as long as the perianth or longer *filaments* subundulate *anthers* oblong dorsifixed *Ovary* sessile 3 celled many-ovuled *Fruit* membranous 3 celled bursting by loculicidal dehiscence *Seeds* compressed

The word Aloe is said to be derived from the Syriac *Alwai* and the Greek derivative *αλον* but in the 10th century the drug was known as Succotrina. In India it is known by the generic name of *Elwa Elia* or *Mushabbar*. Several species yield a bitter juice which when inspissated forms a drug of varying commercial value according to the care with which it has been prepared and the specific peculiarities of the plant or plants from which obtained. Indeed it would seem probable that several species of Aloe afford each of the important commercial forms—viz Barbadose Socotrine Cape Aloes and Natal Aloes. This being so it has been deemed the most satisfactory course to treat first of aloes as met with in the druggist's shop and then to endeavour to discuss the principal facts known regarding the plants from which the aloes met with in Indian commerce are obtained.

History of the Drug Aloes—The following abstract taken chiefly from the *Pharmacographia* will be found to contain the more important facts connected with the early history of this drug. Aloes appear to have been known to the Greeks in the 4th century B.C. for the Arabian historian **Edrisi**, accounting for the Greek occupation of Socotra attributes this to Aristotle having persuaded Alexander to take possession of the island that it produces aloes. The original inhabitants were removed and Ionians placed in charge of the island and of its aloes plantations. In the 10th century aloes were produced only in Socotra and it is reported that they had greatly improved under the Greek management. Aloes were known to **Celsus Dioscorides** and **Pliny** as well as to the later Greek authors and Arabian physicians. Aloes were recommended to Alfred the Great by the Patriarch of Jerusalem and it may therefore be inferred that the drug was not unknown in Britain as early as the 10th century. In 1516 **Pires** a Portuguese apothecary the first ambassador sent to China reports to Manuel King of Portugal that aloes are found in the Island of Socotra Aden Cambaya and other parts the most esteemed being that of Socotra. In the 17th century a direct trade was established between Socotra and England. **Wellstead** who travelled in Socotra in 1835 reported that it must once upon a time have been far more extensively cultivated than at present. He describes it as growing abundantly in parched and barren places on the sides and summits of limestone mountains at an altitude of 500 to 3000 feet. **Mr Wykeham Perry** in 1878 brought specimens of the Socotra aloes to Kew London when it was discovered that it was quite distinct from the plant which by botanists had come to bear the name of Socotra. This new species was by **Mr Baker** named in honour of its discoverer and this interesting fact regarding aloes has since been confirmed by **Prof J B Balfour**, who has clearly shown that the plant **A. Perryi** is the true source of the Socotrine Aloes of commerce.

From about the 10th century it seems the cultivation of the aloes became in all probability distributed over the tropical portions of the globe

ALOE

Medicinal Properties of the Aloe

In the 17th century Ligon who visited the Island of Barbados speaks of the Aloe as if it were indigenous. This was about 20 years after the first settlers had taken up their residence. He mentions a number of useful plants which they had introduced into the island. Barbados aloes first appeared in the London drug warehouses in 1693. Cape aloes in 1780 and Natal aloes in 1870 (*Flückiger and Hanbury's Pharmacog.*)

For further particulars regarding the history of Indian aloes the reader is referred to **A vera** (See page 186)

816

MEDICINAL PROPERTIES AND USES

Cultivation and Manufacture—In Barbados where the plant is systematically cultivated the plants are set 6 inches apart in rows 1 to 1½ feet wide the ground having been carefully prepared and manured. The plants are kept dwarf and free from weeds. The leaves are 12 feet long they are cut annually. The cut leaves are rapidly placed in a V shaped trough with the cut end downwards and so arranged that the juice may drain from all the leaves into a jar below. These troughs are placed all over the plantation so as to be easily accessible to the cutters. By the time five troughs have been filled the first is exhausted. The leaves are neither boiled nor pressed and no use is made of them after the juice has drained off. The juice is next inspissated by evaporation but it does not injure by being left for some time in the jar (*Pharmacographia*).

Description and Properties of the Commercial Varieties of Aloes—In an interesting paper of much practical value Dr Squibb (*Pharmacist 1873 p 33 Year Book of Pharm 1874 p 38*) discusses the merits of the commercial forms of Socotrine and Barbados aloes describing the former in its therapeutic effect as comparatively mild and gentle and unirritating with tonic and aromatic qualities while the latter is harsh and drastic producing more irritation and much more liable to over action. He recommends that only the better qualities of the so-called Socotrine aloes be prescribed to human beings while he regards the various forms of Barbados as better adapted to the medication of animals. While this therapeutic distinction holds good—clearly separating the two classes—there are a whole series of forms of the drug which in their external and physical properties blend into each other so completely that it requires almost professional skill to distinguish them. The former class is lighter in colour with a pleasant but feeble aromatic odour. It is mainly by the odour that the forms of aloes are valued by the dealers and it is therefore impossible to describe this test. The inferior kinds of aloes are harsh strong often foetid while the better qualities are faint and aromatic. Recently the numerous forms of Socotrine aloes have in the trade been referred to two classes—red Socotrine and yellow Socotrine the former being held in the highest esteem. Dr Squibb made the curious observation that the red form is at first yellow becoming red as it dries while the yellow only deepens in colour but never becomes red. The term Hepatic Aloes is exceedingly vague and appears to us unworthy to be retained (*Flück and Hanb*). It is applied to any sort of liver coloured aloes its opacity having formerly been attributed to the presence of crystals whereas it is now believed to be due to the presence of a feculent matter the nature of which is unknown although it is most probably produced through the fermentation caused by impurities such as pieces of sheepskin. Dr W Oraig recommends that aloes should be administered only in the form of aloin. He bases his opinion upon one or two important considerations.

1st—Aloin may by exposure to the air undergo considerable chemical change without losing its physiological action as an active aperient
and—The resin of aloes, when thoroughly exhausted of aloin

Chemical Composition of the Aloe.

ALOE

possesses no purgative properties and therefore cannot be the active principle of aloes

3rd —The resin of aloes is not the cause of the griping which sometimes follows the administration of the drug it is a perfectly inert and harmless substance

4th —Aloin is an active principle and in all probability is the only active principle of aloes

5th —Being uniform in strength its dose can be more accurately determined

6th —Its dose being only half a grain to one grain it can easily be introduced into tonic pills without making these too large

7th —By using the active principle all impurities are excluded which are apt to cause griping (*Year Book of Pharm* 1875 p 289)

The *Makhsan ul Adwiya* mentions four kinds of aloes as met with in India viz Socotrine Bokhara or Persian Indian and Arabian The latter is said to be often adulterated with akakia and with gum arabic The Bokharian is pronounced the worst kind being full of stones

Chemical Composition

References —*Fluck & Landt's Pharmacopoeia* 1879 686 *U S Dispens* 15th Ed 155 *Tilden's Year Book of Pharm* 1875 540, *Schmidt's Archiv der Pharm* V No 6 1876 *Pharm Journ* 3rd Series VII 70 *Year Book of Pharm* 1877 38

All varieties of aloes have an odour very much of the same character and a bitter disagreeable taste The odour is due to a volatile oil which the drug contains in minute proportions The most interesting constituents of aloes however are the substances known under the generic term of aloin Chemically these principles appear to be complex phenols The name aloin was originally used to designate the substance found in Barbados aloes but this aloin is now named Barbaloin and the aloins contained in Natal Socotrine and Zanzibar aloes are known respectively as Nataloin and Socaloin or Zanaloin The three varieties of aloin are crystalline and by chemical tests can be readily distinguished Aloes also contain resins certain of which are soluble and the others insoluble in water By the action of reagents aloes afford a large number of derivatives (*Pharmacographia*)

The aloin which is met with in commerce is prepared chiefly if not entirely from Barbados aloes Dr Tilden recommends the following method for the separation of this substance Crushed aloes is dissolved in nine or ten times its weight of boiling water acidified with sulphuric acid After cooling and standing for a few hours the clear liquid is decanted from the resin and evaporated The concentrated solution will be found to deposit a mass of yellow crystals which can be purified by washing pressure and by recrystallization from hot spirit After repeated crystallization the aloin is obtained in the form of beautiful yellow needles which are fairly soluble in water and in alcohol but difficultly so in ether Dr Tilden recommends for the isolation of *analoin* Mr Histed's process which though troublesome is the only process at present known Powdered aloes should be macerated in proof spirit to make a paste and the liquid gradually expressed from the mass The yellow cake remaining is purified by crystallization from water and afterwards from rectified spirit

E von Sommaruga and Egger and also Rochleder consider the aloins to form a homologous series for which they have assigned the formula $C_{17}H_{20}O_7$, barbaloin $C_{16}H_{18}O_7$, nataloin and $C_{18}H_{16}O_7$, socaloin—compounds derived from anthracene $C_{14}H_{10}$ This opinion has not however met with the support of subsequent experimenters and Tilden is of opinion that on the contrary barbaloin and zanaloin and in

ALOE

Trade Returns of Aloes

CHEMISTRY

all probability socaloin are chemically identical and must be expressed by the formula $C_{16}H_{18}O_7$ Tilden speaking of barbaloin and zanaloin says the two bodies resemble each other in appearance and in taste —

(a) *Zanaloin* is slightly paler in colour more soluble it contains more water of crystallization than barbaloin Moistened with nitric acid it gives no immediate coloration, but on the application of heat an intense orange red is developed

(b) *Barbaloin* gives with nitric acid an instant coloration which fades quickly to orange

Both zanaloin and barbaloin under the prolonged action of nitric acid give chrysammic acid and both yield crystallizable chloro and bromo substitution derivatives which resemble each other very closely Socaloin is believed to be identical with zanaloin

(c) *Nataloin* is widely distinct from these crystalline principles but chiefly in its not forming chrysammic acid nor chloro- or bromo- derivatives It is also much less soluble than either of the preceding

On the main features of these opinions Dr Schmidt supports Dr Tilden confirming the formula given for barbaloin and zanaloin

Histed published a most beautiful and convenient test for the three principal forms of aloin A drop of nitric acid placed on a slab gives with barbaloin and nataloin a bright crimson but produces little or no effect on socaloin Barbaloin is further distinguished from nataloin by adding a minute quantity to a drop of oil of vitriol and allowing the vapour from a rod moistened with nitric acid to pass over the surface of the solution Barbaloin (and also socaloin) will undergo no change but nataloin will assume a fine blue colour The nitric acid colour produced with barbaloin rapidly fades but that with nataloin is permanent unless heat be applied These reactions may sometimes be produced with the crude drugs Aloes yields its active matter to cold water and when good is almost wholly dissolved by boiling water but the inert portion or apothème of Berzelius is deposited as the solution cools It is also soluble in alcohol rectified or diluted Long boiling impairs its purgative properties by oxidising the aloin and rendering it insoluble The alkalis their carbonates and soap alter in some measure its chemical nature and render it of easier solution It is inflammable swelling up and decrepitating when it burns and giving out a thick smoke which has the odour of the drug (*U S Dispens* 157) The fact that heat affects the properties of the drug must be clearly borne in mind since the heat used in melting straining and drying which on account of the presence of impurities often becomes necessary before it can be used medicinally will unless carefully performed impair considerably the action of the drug

817

Trade Returns of Aloes

Aloes (Foreign Trade by Sea)

| YEARS | IMPORTS | | EXPORTS AND RE EXPORTS | |
|---------|----------|--------|------------------------|--------|
| | Quantity | Value | Quantity | Value |
| | Cwt | Rs | Cwt | Rs |
| 1879 80 | 792 | 21 330 | 752 | 20 684 |
| 1880 81 | 1 029 | 24 721 | 840 | 19 561 |
| 1881 82 | 1 023 | 23 780 | 469 | 16 489 |
| 1882 83 | 1 345 | 29 514 | 783 | 24 113 |
| 1883-84 | 1 611 | 31 639 | 610 | 21 676 |

A 817

Jafferabad Aloes

ALOE
abyssinica

Detail of Imports 1883-84

TRADE
RETURNS

| Provinces into which imported | Quantity | Value | Countries whence imported | Quantity | Value |
|-------------------------------|----------|--------|---------------------------|----------|--------|
| Bombay | Cwt | R | Aden | Cwt | R |
| Sindh | 1 593 | 30 709 | Arabia | 1 102 | 15 591 |
| | 18 | 930 | China—Hong Kong | 489 | 15 768 |
| | | | | 20 | 280 |
| TOTAL | 1 611 | 31 639 | TOTAL | 1 611 | 31 639 |

Detail of Exports 1883-84

| Provinces from which exported | Quantity | Value | Countries to which exported | Quantity | Value |
|-------------------------------|----------|--------|-----------------------------|----------|--------|
| Bombay | Cwt | R | United Kingdom | Cwt | R |
| Madras | 520 | 20 798 | Straits Settlements | 341 | 18 097 |
| | 90 | 878 | Other Countries | 229 | 2 746 |
| | | | | 40 | 833 |
| TOTAL | 610 | 21 676 | TOTAL | 610 | 21 676 |

The following are the principal forms of Aloe met with either in cultivation in India or in the drug of which a large import and internal trade exists —

Aloe abyssinica, Lam Baker Linnæan Jour XVIII, 174

818

JAFERABAD ALOES

Syn.—A MACULATA Forsk A VULGARIS var ABYSSINICA DC Plantes Grasses sub t 27

Habitat—Dr Dymock informs me that this plant is common on the coast of Bombay and Gujarât and that it furnishes the round cakes known as Jafferabad Aloes. It is a native of Abyssinia and Central Africa.

Botanic Diagnosis—Stem simple 12 feet in height 23 inches in diameter. Leaves ensiform $1\frac{1}{2}$ – $2\frac{1}{2}$ feet long broad acuminate green often white spotted base rounded. Raceme dense oblong bracts lanceolate acuminate 34 lines long. Flowers yellow base green tube short teeth long. Stamens often exerted. Introduced into Europe in 1777.

Medicine—It seems probable that this species may contribute along with the two following to the so-called Moka Aloes imported from the Red Sea coast into Bombay or by way of Zanzibar from Socotra and re-exported to Europe.

Under the heading Aloe abyssinica, Baker Dr Dymock, in his *Materia Medica of Western India* p 667 gives an interesting history of the Indian Aloes. The Mohammedans he informs us learned the preparation and uses of the drug from the Greeks. Its manufacture spread from Africa and Arabia, ultimately reaching India. He further states that the Hindus though unaware of the method of preparing the inspissated sap have long been in the habit of using the plant medicinally under the name *Ghiria kumari*. In Eastern and Southern India the *Ghiria kumari* is one of the forms of A vera, probably an indigenous plant to India while A. abyssinica seems to have been introduced. It may be the case, however, that all wild

MEDICINE
Aloes
819

Leaves
820

A. 820

ALOE
succotrina.
Socotrine Aloes.

 Pickled
 821

or cultivated Aloes of India go by the name of *Ghurta kumari* (See *A vera*, var *officinalis*)

Pickled Aloes—Dr Dymock says that the leaves and flower stalks of this aloe (? *A abyssinica*) are pickled by the natives of Gujarát after having been soaked in salt and water

§ The aloes cultivated in the Kanara district are more succulent yielding larger quantities of viscid juice The fresh leaves are used as emollients in lieu of linseed poultices meal flour &c for abscesses or whitlow The leaf is first roasted and then laid open on its inner side and applied whilst warm It hastens suppuration (*Surgeon Major W Nolan M D, Bombay*)

822

Aloe ferox, *Miller* is one of the principal plants from which Cape Aloes are obtained

823

A. spicata, *Thunb*, is also one of the Cape Aloes plants

824

A. succotrina, *Lam*, and **A Perryi**, *Baker*

THE SOCOTRINE ALOES OF COMMERCE, THE YAMANI OR MOKA ALOES OF BOMBAY

In the present state of our knowledge of the subject it has been deemed advisable to discuss the various forms of the drug commonly known as Socotrine aloes under this head without attempting to separate the two species mentioned above Recent discoveries in the Island of Socotra itself made by Mr Perry and later by Professor Bayley Balfour have shown **A Perryi** to be the species from which the pure Socotrine aloes is derived but much of what is sold commercially as Socotrine aloes is doubtless got from other species and chiefly from **A succotrina** This is specially true of the Socotrine aloes not obtained from the Island of Socotra

Syn—*A PERFOLIATA* var *SUCCOTRINA* Curt *A VERA* Miller See BAKER in *Linnæan Journal* XVIII 173)

Vern—In the chemist's shop Aloes go by the same names as are given to the next species viz *Sibr* or *Sabir* ARAB *Bôle sivih* PERS *Musabbar ilva yalva* HIND *Môshabbar* BENG *Elva eliya musanbar* DUK *Musambarb/l* MAR *Kariya pôlam* TAM *Mushambaram* TEL *Chennan iyakam* MAL *Eliya* CUTCH *Yeliyo* GUJ *Mou* or *mo* BURM *Kalu bôlam karibôlam* SINGH The name of the Socotrine aloes is *Sibr sagôtari* ARAB Met with in all the bazars of India

References—*Flück and Hanb Pharmacog* 679, *Med Plants Benil & Trim* IV 283 *U S Dispens* 15th Ed p 151 *Pharm Ind* 236 *Royle Mat Med* Ed Harley 398 *Pereira in Pharm Jour* ser I vol XI p 439 *Forskål Fl Egypt Arab* p 73 *Wellstead in Journ R Geogr Soc V* p 197 *Kew Report 1880* pp 21 and 54 *Year Book of Pharm* 1874 to 1884 *Pharm Jour* vols III IV V VI VII VIII *American Pharm Soc Proc* vol XXV

Habitat.—Dr Trimen writes me that he regards **A succotrina** as indigenous to South Africa and not Socotra or the Red Sea districts this is the modern opinion although as the name implies it was formerly viewed as a native of the Island of Socotra **A Perryi**, as far as has been discovered hitherto is peculiar to Socotra and the presumption is that it is the species from which the Socotrine aloes is obtained in the Island of Socotra itself

Botanic Diagnosis—**A succotrina**, *Lam*—*Stem* woody often 6 feet in height strongly ridged with scars of the fallen leaves often becoming dichotomously branched *Leaves* crowded the rosette 2 to 3 feet in diameter ensiform falcate, sessile amplexicaul 15 to 20 inches long tapering to an acute point *Scape* exceeding the leaves angled, purplish

A 824

Socotrine Aloes

ALOE
succotrina.

green flowers numerous forming a narrow erect spike-like raceme *pedicels* erect curved so that the flowers are pendulous *bracts* shorter than the pedicels *Flowers* about $1\frac{1}{2}$ inch long red below orange-red or pinkish in the middle with greenish white tips deeply cut into 6 obtuse segments *Stamens* 6 3 sometimes exceeding the perianth

A Perryi, Baker — *Stem* simple 1 inch in diameter scarcely rising above ground *Leaves* crowded much shorter than in the preceding and rounded at the base *Racemes* dense *bracts* lanceolate sub equal to the pedicels *Flowers* red 9 to 10 lines long *segments* oblong three times the length of the tube *Stamens* included

Medicine — In small doses the drug aloes prepared from the juice of the leaves is stomachic tonic in larger doses purgative and indirectly emmenagogue It is a remedy of great value in constipation caused by hysteria and atony of the intestinal muscular coat It is also very useful in atonic dyspepsia jaundice amenorrhœa and chlorosis Locally applied dissolved in glycerine it is valued as a stimulant application in skin diseases (*Pharm Ind*)

Dr Dymock informs me that a mixture of aloes and myrrh is known in the Deccan as *mussabar* and that Socotrine aloes is largely imported into Bombay It appears that **Dr Dymock** (pp 669 and 670) regards the Socotrine aloes as distinct from the *moka* He may be correct in this opinion but it seems doubtful if any Socotrine aloes can be said to be the product of but one species even when imported direct from Socotra and it is more than probable that the purer forms of African aloes are regularly sold under the time immemorial reputation of the Island of Socotra the more so since all the imports from Socotra preserving the old trade route come by way of Zanzibar to Bombay and England The distinction which it is possible to establish is that pure Socotrine aloes is the product of **A Perryi**, while the aloes to which the name *moka* or Arabian aloes may in the future be restricted is the product chiefly of **A succotrina** and one or two allied species inhabiting the Red Sea coast and the Arabian coast of the Persian Gulf It may accordingly be found convenient to refer Socotrine aloes of commerce to two great sections —

(A) The Pure Forms of Socotrine Aloes (contain Socaloin)

Speaking of these separate forms **Dr Dymock** says of Socotrine aloes "This drug is imported into Bombay *via* Zanzibar and the Red Sea ports It is packed in skins the packages varying much in size and shape and often containing a large proportion of rubbish such as pieces of hide stones &c In Bombay the skins are opened and the aloes repacked in boxes for exportation to Europe The best Socotrine aloes is of a reddish brown colour hard externally soft internally the odour is aromatic and peculiar when powdered or in thin fragments it is orange brown sometimes it is almost fluid

Fluckiger and **Hanbury** in their *Pharmacographia* (1879 p 684) say of this form The SOCOTRINE so called BOMBAY EAST INDIAN or ZANZIBAR ALOES which when opaque and liver-coloured is also known as HEPATIC ALOES is imported from Bombay into England in kegs and tin lined boxes When moistened with spirit of wine and examined in a thin stratum under the microscope good Socotrine aloes is seen to contain an abundance of crystals As imported it is usually soft at least in the interior of the mass but it speedily dries and hardens by keeping losing about 14 per cent in the process 'Some fine aloes from Zanzibar of which a very small quantity was offered for sale in 1867, was contained in skin When it is fluid it is known as *Liquid Socotrine Aloes* This was at one time supposed to be different from *Hepatic*

MEDICINE
824a

Socotrine
Aloes.
Pure
825
Impure
826

827

A 827

**ALOE
vera.****Indian Aloes**

Aloes and that the latter owed its opacity to crystals But it has been shown that the opacity is due to some feculent matter and that therefore opaque aloes from whatever plant derived equally deserves the commercial name of hepatic aloes

Bentley and Trimen say the colour of Socotrine aloes varies the reddish tint is also liable to great variation thus sometimes the masses are garnet red at other times they are much paler and when quite dry are golden red and yield a golden yellow powder By exposure to air the colour is deepened The fracture is usually smooth and resinous but sometimes rough and irregular

Impure
Socotrine
828

(B) The Impure Forms or Yamani or Moka Aloes (contain Zanaloin ?)

This **Dr Dymock** informs us is imported from Arabia into Bombay It is the kind of aloes most in use by the natives of India It varies much in quality It is of a black colour in mass and somewhat porous but thin fragments are translucent and yellowish brown the odour is powerfully ætetic without the aroma of Socotrine or Jafferabad aloes medicinally it appears to be sufficiently active With nitric acid it gives a deep red colour like Barbados the solution in sulphuric acid is not affected by nitric acid fumes (*Mat Med W Ind* 670) The *Pharmacographia* says

A very bad dark fetid sort of aloes is brought to Aden from the interior It seems to be the *Moka Aloes* of some writers

Special Opinions —§ Useful in combination with sulphate of iron in cases of irregular or suspended menstruation also in hysteria headache constipation and flatulence (*Brigade Surgeon F H Thornton B A Monghyr*) In sprains and inflammations applications of aloes and opium are found to be very beneficial in allaying pain &c (*Assistant Surgeon Doyal Chunder Shome Campbell Medical School Sealdah Calcutta*) Purgative and emmenagogue when applied externally over the abdomen in puffiness of the abdomen The tincture in combination with simple soap liniment when applied over the abdomen of children who cannot tolerate aperients by the mouth acts freely on the bowels (*Surgeon W Barren Bhuj Cutch Bombay*)

Given internally by the hakims in bronchial catarrh and jaundice externally applied with lime juice in contusions and sprains (*Surgeon Major F T Fitzpatrick M D Coimbatore*) Formed into a paste with hot water it is useful when applied to severe sprains and contusions (*Surgeon Major F F L Rutton M D M C Salem*) Aloes rubbed up with opium myrrh and white of egg applied to any swelling causes absorption soothes and relieves pain (*Surgeon Major Henry David Cook Calicut Malabar*)

829

Aloe vera, Linn

BARBADOS ALOES, INDIAN ALOES, Eng ALOES, Fr ALOE, Germ

Syn — A BARBADENSIS *Müller* A VULGARIS (*Bauhin*) *Lam*

Vern — *Ghi kavar* *Ghi kanwar* or *ghigvar kumari* HIND *Ghrita kumari* *gria kunwar* BENG *Ghrita kumari kanyá* SANS *Sabbará nubátussibi* ARAB *Darakhte sibr* PERS *Eliya* (the resin) *kor kand* (the plant) *kumari ghi kanwar kanwar-patha* DUK *Koraphad* MAR *Kunwar* GUJ *Kanvár kora kanda kora-phad lephes* SIND *Katrashtai* or *Kattalai shóttu katrashtai*, or *shóttu katrashtai* or *kattalai* TAM *Kalabanda* TEL *Katruvasha* or *kattala* MAL *Lola-sora* KAN, *Komarika* SINGH *Tasuvon le-pá* or *shasaon le-pá* BURM

The resinous extract is generally known as *Sibr* PERS (See also names given under A *succotrina*)

Mr J G Baker in the *Linnean Society's Journal* Vol XVIII p

A 829

Indian Aloes.

ALOE
vera.

176 has established the synonyms above given and formed under this species two varieties **Bentley** and **Trimen** in their *Medicinal Plants* reduced all the names for the forms of this species to mere synonyms under the name of **A vulgaris, Lam** Mr **Baker** seems correct and the varieties formed by him are well known to the natives of India, and their individual properties have been recognised in native practice from almost time immemorial

Habitat.—There are many sub-varieties of this plant met with in cultivation throughout India some of which have run wild as for example on the coast of South India All the forms of this species must however be described as natives of Northern Africa from Morocco eastward; of the Canary Islands and of Southern Spain They have long been cultivated in the West Indian Islands Jamaica Antigua and Barbados where they were probably introduced at an early date from the Canary Islands

Botanic Diagnosis—*Stem* short 1 2 feet 2 3 inches diameter *Leaves* ensiform densely crowded $1\frac{1}{2}$ to 2 feet long broad at the base attenuated at the apex to a blunt point pale green glaucous distantly dentate *Scape* 2 3 feet long simple or branched *Racemes* dense $\frac{1}{2}$ to 1 foot long *bracts* lanceolate acute 3 4 lines long *Perianth tube* yellow cylindrical 9 12 lines long *segments* three times as long as the tube *stamens* and *style* distinctly exserted

Properties and Cultivation of Barbados Aloes

830

The plant is readily cultivated growing in the driest situations and poorest soils The bitter juice of the aloes is contained in vessels placed just below the epidermis It escapes when the leaves are cut off close to the stem it is at first colourless but quickly acquires a brownish tinge on exposure to the air Its activity seems to vary with the age of the leaves from which it is drained and the season of the year In Barbados where this species is systematically cultivated the leaves are cut annually in March and April during the heat of the day The better quality of aloes is that obtained by allowing the leaves to drain naturally for if the leaves be artificially pressed the juices of the leaf are mixed with the latexiferous fluid and the quality of the drug greatly impaired The natural heat of the sun is also the best means of drying the inspissated sap for if artificial heat be used the active property of the drug is weakened (*Bentley & Trimmen*)

General Character—In addition to the forms of **A vera** the following are also cultivated in Barbados **A succotrina**, **A purpurescens**, and **A arborescens**, all of which and many hybrids between them yielding the Barbados Aloes of commerce

In colour Barbados aloes is not uniform it varies from a deep reddish brown or chocolate to almost black It has usually a dull waxy fracture and is almost perfectly opaque even at the margins When it presents a smooth glassy fracture it is known as Capey Barbados Its odour is disagreeable and even nauseous the powder of Barbados aloes is of a dull olive yellow It is much more powerful than Socotrine aloes but more subject to produce griping pains It is almost entirely soluble in proof spirit and under the microscope the solution exhibits numerous crystals It is said to give in aqueous solution a fine rose colour with chloride of gold or with tincture of iodine a reaction which does not take place with other aloes

Dye—In *Spons Encyclopædia* there occurs an account of the preparation of the dye Chrysammic Acid It is prepared by heating 8 parts of nitric acid with 1 part of aloes After the violent action has subsided, a second proportion of aloes is added to the mixture until the fumes of

DYE
831

A. 831

**ALOE
vera****Indian Aloe, var littoralis.**

hypo nitric acid subside The mass is then poured into water when chrysammic flakes settle in the bottom of the vessel These are washed several times in water The crystals change their colour under varying circumstances giving a purple colour to silk black to wool and pink to linen A French firm has recently used it to give a beautiful brown known as vegetable brown which is produced through the agency of sulphuric acid This dye is bright it resists strong alkaline action it combines with most of the anilines and other dyes economising them and rendering them thoroughly fast and it is not expensive

It would be exceedingly interesting to know if the existence of this dye or dye auxiliary be known to the cultivators of Indian aloes and if it has ever been extracted in India The uses of the dye are likely to be greatly developed and it therefore seems desirable that it should receive the attention of the Indian authorities

**FIBRE
832**

Fibre—The leaves yield a good fibre It seems highly desirable that the idea of combining the preparation of the drug aloes with the separation of the fibre should be brought before the public In the account of the preparation of the drug practised in Barbados (given in the preceding page) it is stated that after the sap has drained off the leaves are rejected and no further use made of them This seems an unnecessary waste of material since from these rejected leaves a most useful fibre could be prepared

**MEDICINE
Juice
833**

Medicine—As a medicine the *inspissated juice* from the forms of this species is in India regarded as but little inferior to the imported Socotrine aloes It is an aperient and deemed highly beneficial to persons predisposed to apoplexy The *FRESH JUICE* from the leaves is said to be cathartic cooling and useful in fevers spleen and liver disease enlarged lymphatic glands and as an external applicant in certain eye diseases The *PULP* of the leaves is in native practice applied to boils and is regarded as acting powerfully on the uterus and useful as an emmenagogue It is also largely used in veterinary medicine The *ROOT* is supposed to be efficacious in colic

836

Var littoralis, sp Koenig

Vern.—*Chhōtu ghi kanvar chhōta kanvār* HIND DUK *Chhōta jangli ānanash* BENG *Shiru katrash ai or shiru katt lai* TAM *Chinna kalabanda* TEL *Cheru kattru rasha* MAL *Sh me katt ili* KAN *Dhakutā kunvara* BOMB *Nahāni kunvar* GUJ *Lahani kumari* MAR Ainslie gives the plant the Sanskrit name of *kumari* *Koyangali* is the Burmese name for a species of *Crinum* but it is also sometimes applied to this plant

Syn—§ This in my opinion is a stunted variety of **A indica, Royle** (*Deputy Surgeon General Bidie C I E Madras*)

Habitat—This is altogether a much smaller form than the typical condition of the species having yellow flowers in simple spikes with the bases of the leaves not half so broad as in the preceding and always of a pale green colour It has become quite naturalised on the southern coast of the Madras Presidency

Botanic Diagnosis—*Leaves* 15 18 inches long 1½ broad *scape* simple 2 feet long

**MEDICINE
837**

Medicine—Ainslie says The pulp of the leaves of this small and very succulent plant when well washed in cold water is prescribed as a refrigerant medicine in conjunction with a small quantity of sugar candy The same pulp so purified and with the addition of a little burnt alum the native practitioners consider as a valuable remedy in cases of ophthalmia The opinion of Madras officers as to this local form of aloes would be most acceptable Dr Waring, in the *Pharmacopœia of India*

A 837

Indian Aloe, *var officinalis*ALOE
vera.

says By inspissating the viscid juice of the leaves of *A littoralis* collected at Cape Comorin where the plant is in great abundance the editor in 1853 prepared several ounces of excellent aloe which proved actively purgative in the same doses that the officinal aloe is usually prescribed in Dr W Dymock of Bombay corroborates the statement that this plant yields very good aloe adding that he has tried it both in the fresh and dried state It appears certain that with a little care aloes of good quality might be obtained from this source in considerable quantities at a cost far less than that of the imported article The aloe procurable in the bazars (chiefly imported) is generally of a very inferior description

The freshly expressed juice is in almost universal use as an external refrigerant application to all external or local inflammations

Dr Dymock (*Mat Med W Ind* 668) gives an interesting account of Indian aloe from the pen of Garcia de Orta a Portuguese physician who in 1534 accompanied Admiral Martin Alfonso de Souza to Goa From this it would appear that the juice and fresh plant were at that time used in South India and the species was most probably the *var littoralis* In *Clusius* translation of de Orta's work occurs a prescription for the use of the fresh plant *vis aloe leaves sliced 3 ozs salt 3 drms heat to boiling strain add 1 oz of sugar to be taken cold early in the morning*

§ Laxative tonic useful in diseases of the spleen The decoction of the root is prescribed as a febrifuge (*Surgeon W Barren Bhuj Cutch*)

Very largely used in Mysore as an aperient and emmenagogue (*Surgeon Major John North Bangalore*)

Var officinalis, sp Forsk

838

Syn—*A RUBESCENS DC A INDICA Royle*

Vern.—*Lal kumar lal ghigav r kanv r* HIND *Ghikau r N W P*
Ghrita kam ri or ghrita kanvar BENG *Gh kanvir lal ghi kanvar*
kanvar phid kalband DUK *kum r (Guj)* *Korphad* MAR *Nabā*
tussir e ahmar ARAB *Darakht sibre surkh* PERS *Sirragha kuttalay*
(see Ainslie) *shwappu katrash ai* or *shwipp-kuttalai* *shwappu*
shhōttu katrash ai *kumari* TAM *Ena kalabanda* TEL *Chovanna*
katru vasha MAL *Kempu-lī varu* KAN *kuta komurika* SINGH
Avu tas von le-pa shasavon le pa BURM

Habitat and Botanic Diagnosis.—This is the form met with in a semi wild condition in Bengal and the North West Provinces It has beautiful reddish and orange flowers with the bases of the leaves purple-coloured and so dilated as to have in all probability suggested the name *A perfoliata*, given by popular writers to this and many other species of aloe

Medicine—§ In cases of chronic fissures and ulcers about the rectum indigenous aloes have been largely used by the natives both internally and externally It acts also as an emmenagogue and anthelmintic It is a favourite medicine for intestinal worms in children As an aperient it is generally given in combination with *turkud* or scammony Dissolved in uttar of roses it is used in various affections of the eye Mixed with *bar tung* it is said to be very useful in chronic discharges from the nose or ears Dissolved in spirit it is used as a *hair dye* and it is said that it also stimulates the hair to grow Dissolved in warm water and spread over a betle-leaf and applied while hot to the belly of a child it is said to act as an aperient (*Asst Surgeon Gholam Nabi*) A sweetmeat *halwa* is prepared from the pulp of the leaves and given in cases of piles and apparently with very good effect. (*Surgeon Major C W Calthrop M D Morar*)

"The resinous extract obtained from this plant is applied to swellings

MEDICINE.
839

ALOPECURUS

Fox tail Grass

in the form of a paste to cause absorption. It is used internally by native practitioners in melancholia and brain diseases complicated with gastric symptoms. It produces griping to correct which is added confection of roses and mastich. Given as a night pill in hæmorrhoids. A paste of fresh aloes and turmeric relieves the pain of contusions. (*Surgeon G A Emerson Calcutta*) The pulp with a solution of alum is very extensively used by native practitioners in every form of ophthalmia but especially in catarrhal and purulent ophthalmia. (*Asst Surgeon Jaswant Rai Mooltan*)

The inspissated juice in combination with gum asafœtida, is applied as a warm plaster in colic and the pneumonia of infants. It is also given internally in these cases in doses of 1 grain with borax in the same quantity with the mother's milk. (*Lal Mahomed Hoshangabad Central Provinces*) 'It is applied over the abdomen for constipation and tympanitis. (*Surg on Major Robb Ahmedabad*) I have seen the juice administered with powdered turmeric by village native practitioners in enlarged spleen. (*Assistant Surgeon Shib Chunder Bhuttacharya Chanda Central Provinces*) Aloes have been found useful in piles mixed in small quantities with sulphur. It is applied by natives externally in the form of lep—paste—in pleurisy. (*Assistant Surgeon Bhugwan Das Rawal Pindi*) A sort of pickle prepared with aloe salt and ajowan is very useful in colic and dyspepsia. (*Surgeon J C Penny M D Amritsur*)

Inspissated juice mixed with sugar frequently given in gonorrhœa with great advantage. (*Brigad Surgeon S M Shircore Moorshedabad*)

The fresh juice of the leaves is taken with milk and water as a remedy for gonorrhœa and metritis. It acts as a mild purgative emollient and demulcent. (*Brigade Surgeon J H Thornton Monghyr*) Hospital Assistant Gopal Chunder Gangooly of the Noakhally Dispensary reports that he has used the fresh pulp of the leaves mixed with sugar in cases of gonorrhœa with good results. It acts as a demulcent. (*Surgeon Anund Chunder Mukerji Noakhally*) The fresh juice from the leaves is cooling diuretic largely used by the natives in gonorrhœa. The tender pulp is eaten in rheumatism. (*Assistant Surgeon J N Dey Feypore*)

I have used it as a stomachic purgative in veterinary practice with much effect. It makes a good adjunct to sulphur for internal use in bad cases of mange. In the human subject in cases of chronic cough due to dyspepsia and in cases of foul evacuations I have given it in 5 grain doses with *ghu* in the former with sulphate of iron in the latter two or three times a day with much benefit. (*Surgeon K D Ghose Khulna*)

The indigenous drug known in the bazars as *Musubbar* has all the properties of the Socotrine or Barbados aloes. (*Surgeon R D Murray M D Burdwan*)

A piece of the fleshy pulp (peeled), about two inches square with 4 grains of turmeric and 10 grains of burnt borax is a favourite remedy for enlargement of the spleen associated with constipation of the bowels. (*Surgeon Major E C Bensley Rajshahye*)

One grain of bazar aloes with 1 grain of bazar sulphate of iron and 1 grain of asafœtida is often used by natives in the form of a pill for spleen enlargement. (*Surgeon K D Ghose Bankura*)

Food—The pulp of the leaves is eaten by the poorer people in times of famine the seeds also are eaten

FOOD
840
841

ALOPECURUS, *Linn Gen Pl III 1140*

A genus of grasses belonging to the Tribe PHALARIDÆE comprising in all some 20 species inhabitants of Europe and temperate Asia

| The Alpinia or Galangal | ALPINIA |
|--|---------------|
| <p><i>Spike</i> compressed one flowered peduncled in the sheaths of the upper leaves; <i>glumes</i> 3 4, the 2 exterior empty, compressed, connate below membranous and awnless <i>Pale</i> 1 scarious 5 veined awned on the back <i>stamens</i> 3 <i>style</i> long <i>stigma</i> filiform elongated shortly hairy</p> | |
| <p>Alopecurus agrestis, Linn <i>Duthie's List of Grasses</i> 25, GRAMINEÆ SLENDER FOX TAIL GRASS, BLACK GRASS</p> | 842 |
| <p>Habitat.—Found in the Panjáb in cultivated ground Botanic Diagnosis.—<i>Stem</i> erect, 1 to 2 feet high roundish above <i>panicle</i> tapering slender <i>Glume</i> glabrous but with a row of short cilia on the back acute connected below awn from near the base of the pale and projecting half its length beyond A troublesome weed</p> | |
| <p>Fodder.—Duthie quoting Parlatores describes it as a good fodder grass fresh or dry</p> | FODDER 843 |
| <p>A. geniculatus, Linn <i>Duthie's List of Grasses</i>, 25 FOX TAIL GRASS</p> | 844 |
| <p>Vern.—<i>Pumila</i> N W P Syn.—<i>A. FULVUS</i> Sm</p> | |
| <p>Habitat.—Inhabits the plains of Northern India in wet places ascending the Himalaya to Kumaon and Kashmir viley</p> | |
| <p>Botanic Diagnosis.—<i>Stems</i> ascending smooth kneed and swollen at the joints about a foot long branching below knots generally fleshy <i>Panicle</i> cylindrical 1 2 in long <i>Glume</i> blunt, connected below ciliate exceeding the pale <i>awn</i> from near the base of the pale and projecting half its length beyond it <i>Pale</i> when opened out oblong blunt slightly notched <i>Anther</i> ultimately violet yellow <i>Styles</i> mostly combined</p> | |
| <p>Fodder.—Mueller describes it as a good fodder grass for swampy land A variety <i>A. pumila</i> was found by Royle on the banks of the Jumna</p> | FODDER 845 |
| <p>A. pratensis, Linn <i>Duthie's List of Grasses</i>, p 26 MEADOW FOX TAIL GRASS</p> | 846 |
| <p>Habitat.—Inhabits the North West Himalaya 5000 to 8000 feet, ascending in Lahoul to 13000 feet also found in Kashmir and on the Panjáb plains Is fond of rich pasture lands</p> | |
| <p>Fodder.—A perennial pasture grass considered one of the best of its class Sheep thrive well on it Loudon mentions it as an excellent fodder grass in England</p> | FODDER 847 |
| <p>Since it requires two or three years to attain perfection it is disqualified from becoming part of a rotation of crops For fallow and waste lands it is however very valuable especially in damp soils It has been ascertained that if mixed with white clover this grass after the second year will support five ewes and five lambs on an acre of sandy loam especially if the soil contains lime. For permanent pastures in warm temperate climates this grass is one of the best.</p> | |
| <p>ALPINIA, Linn <i>Gen Pl</i> III, 648</p> | 848 |
| <p>A genus of SCITAMINEÆ belonging to the tribe ZINGIBEREÆ containing some 40 species inhabiting the tropical and sub tropical regions of Asia, Australia, and Pacific Islands</p> | |
| <p><i>Rhizome</i> thick, often aromatic horizontal creeping <i>Inflorescence</i> a thyrsate dense-flowered raceme, rarely a lax panicle <i>Calyx</i> superior forming a loose tube cut into 3 lobes. <i>Corolla</i> with the tube nearly as long as the calyx or sometimes a little longer <i>Andracium</i> of six staminodes</p> | |
| <p>A. 848</p> | |

**ALPINIA
Galanga.****The Greater Galangal and Galangal Cardamom.**

in two rows of 3, *outer row* inserted at the mouth of the corolla the two *posterior* or abortive stamens small forming thickened glandular horn-like bodies or absent the anterior forming the labellum or inner and fourth petal *inner row* with the two *anterior* stamens reduced to glands inserted upon the apex of the ovary and the *posterior* developed into the solitary fertile stamen *Stamen* equal or nearly equal to or only half the length of the corolla *filament* generally flattened concave embracing the style *connective* flattened not prolonged beyond the anthers or if prolonged forming a short broad rounded entire or bifid appendix *Ovary* inferior 3 celled many seeded *style* filiform passing between and behind the anthers within the staminal sheath often compressed below by the glandular stamens *stigma* capitate *Fruit* globose an indehiscent berry or rarely bursting into 3 valves.

The genus is named in honour of the Italian botanist Prosper Alpinus

849

Alpinia Allughas, Roscoe

Vern — *Taro taruko* BENG

Habitat — A native of Bengal Assam Burma and Ceylon also of the Konkan in Western India

Medicine — The aromatic rhizomes are used by the natives medicinally

MEDICINE

850

851

A. calcarata, Roxb Fl Ind Ed C B C, 23

Habitat — A native of China cultivated in gardens in India introduced in 1799

Botanic Diagnosis — *Leaves* linear lanceolate polished *Spikes* compound erect *Flowers* large in pairs or more expanding at different times *Outer petals* 3 linear equal *labellum* ovate-oblong apex curved and bifid

MEDICINE

852

Medicine — Dr Moodeen Sheriff says that this is sold as a substitute for galangal in Haidarabad and other parts of India The rhizomes however possess no pungency

A Cardamomum, Roxb, see Elettaria Cardamomum, Maton

853

A. Galanga, Willd

The Rhizome — THE GREATER GALANGAL OF JAVA GALANGAL Eng GALANGA Port

The Fruit — THE GALANGAL CARDAMOM

Syn — AMOMUM GALANGA Lour

Vern — *Kulanyan kulinyan bara kulanyan* or *bara kulanyan* HIND BENG *Kolinjan GUJ Bari-pan ki jar malabari panki jar BOMB, Kosht kulinyan MAR Bara khulanyan bari-pan ki jar or sufed pan ki jar DUK Kunjar kathi SIND Damparastma kulinyana SANS Khulanyane-qasbi khulanyan e kabir ARAB Khusrave dwue kalan PERS Pera-rattai TAM Pedda dumpa-rash traham TEL Peraratta MAL Dumpa rasmi KAN Padagoji BURM*

Many of the names for this root stock indicate an erroneous idea that it is the root of the betel leaf plant viz *pan ki jar* Hanbury suggests that the Arabic word *khalanyan* may have been derived from the Chinese *liang kiang* (wild ginger) which in Europe became further corrupted into galangal garingal and (in German) galgant

Habitat — A perennial plant native of Java and Sumatra, now cultivated in East Bengal and South India

Botanic Diagnosis — A perennial with broad lanceolate sessile sheathing leaves, having a short rounded ciliate ligule from 12-24 inches long by

A 853

| The Greater Galangal and Galangal Cardamom | ALPINIA Galanga |
|--|--|
| <p>4 6 broad stem when in flower 6 feet high the lower half^o embraced by the smooth leaf sheaths <i>Panicle</i> terminal erect oblong composed of numerous spreading simple dichotomous branches each supporting 2 3 6 pale greenish white faintly fragrant flowers <i>Calyx</i> scarcely the length of the corolla tube <i>Labellum</i> oblong stalked arching towards the stamen lip bifid <i>Capsule</i> the size of a cherry deep orange red seeds often only one in each cell (<i>Roxb Hance Linn Journ XIII</i>)</p> <p>Description of Bazar Products—THE RHIZOME—<i>The Greater Galangal</i>—Recognised from the <i>Lesser Galangal</i> by its larger size feeble odour and taste and by its deep orange-brown skin contrasting prominently with the pale buff hue of the internal structure</p> <p>THE FRUIT—<i>The Galangal Cardamom</i>—About half an inch long oblong somewhat constricted in the middle or at times even pear shaped obscurely three sided Often shrivelled on one side from being collected when immature In colour from pale to deep reddish brown externally and internally whitish Seeds united in a three lobed mass invested by a white integument each mass consisting of two seeds one above the other Seeds ash coloured three cornered finely striated towards the hilum connected to the axillary placenta by a long broad tuniculus Aril tough nearly surrounding the seed seeds pungent burning with an aroma resembling that of the rhizome (<i>D Hanbury Science Papers 107</i>)</p> <p>History—<i>Garcia de Orta</i> physician to the Portuguese Viceroy of India at Goa in 1568 was the first writer who pointed out that in India there were two forms of Galangal the lesser and more powerful root stock imported from China and the larger a native of Java The former alone is that met with in Europe a rhizome partaking of little medicinal virtues that are not possessed by ginger but which nevertheless enters into many ancient prescriptions still in use</p> <p>Dye—<i>Mr Buck</i> says that this root stock is imported into the North West Provinces from the Panjab and is used in calico printing along with myrabolans</p> <p>Medicine—The rhizomes of this species are aromatic pungent and bitter and are used in the form of an infusion in fever rheumatism and catarrhal affections As a drug they are supposed to improve the voice The aromatic tubers are sometimes used as carminative or fragrant adjunct in complex prescriptions but they have nothing peculiar in their properties or action (<i>U C Dutt</i>) How far these properties may have been intended to be attributed to this root stock or should have rather been given to <i>A officinarum</i> cannot be accurately determined The statements of Indian authors have to be accepted for the present but it seems probable that future enquiry may show that while both the greater and the lesser galangals are regularly imported into India as far as their medicinal properties are concerned the former is only used as a substitute for the latter being commercially less valuable and less active in its therapeutic properties It is however difficult to determine in many cases to which species authors refer <i>Dr Irvine</i> in his <i>Medical Topography of Ajmere</i> says Root of this plant is hot and stimulating used in <i>mesaliks</i> has a sweet scent is put into bazar spirits to make it more intoxicating This habit of flavouring spirits with galangal also prevails in Russia—see under <i>A officinarum</i> The seeds also possess similar medicinal properties</p> <p>§ Hakims use it in impotence bronchitis and dyspepsia It is disinfectant used to destroy bad smells in the mouth or any other part of the body It is also advocated in diabetes mellitus (<i>Assistant Surgeon F N Dey Feypore</i>) In Mysore a domestic medicine much used by old people with bronchial catarrh (<i>Surgeon Major John North</i>)</p> | <p>DYE 854</p> <p>MEDICINE Rhizome 855</p> <p>Galangal Cardamoms 856</p> <p>Seeds 857</p> <p>A 857</p> |

**ALPINIA
Khulanjan****The Khulanjan.**

858

(Bangalore) I have known natives who think this drug improves the voice (Surgeon Major C F McKenna Cawnpore)

Alpinia Khulanjan, *Moodeen Sheriff Suppl Ind Pharm*, 268

Habitat — § This plant is found growing in several gardens at Madras and its rhizome when dried bears the greatest resemblance to the Lesser Galangal (*A chinensis*). The root is not sold in the bazar but when sent there it was recognised by the same native names as those of the Lesser Galangal

A few years ago when I first found the plant I thought it to be *A chinensis* but on examining it several times when in flower I found it to be a new species of *Alpinia*, not hitherto described by anybody as far as my knowledge extends. I have therefore named it *Alpinia Khulanjan*, after its native appellation *khulanjan* and have described it as minutely as I could in the *Supplement to the Pharm of India* pp 268 and 269

Description — If the root of this plant is cut into pieces and dried it presents the following characters. Tuberous about the thickness of the little finger somewhat thicker at one end than at the other from one and a half to three inches long often knotty and forked reddish brown externally and greyish internally annulated or marked with white rings slightly wrinkled smell warm and aromatic and taste strongly pungent and peppery. This root is somewhat smaller and lighter in colour than the Lesser Galangal of the shops but slightly stronger in smell and taste

MEDICINE.
859

Medicine — With regard to the medicinal properties of the root of *A Khulanjan*, it is not only stimulant carminative stomachic and expectorant like ginger but also a very good stimulant tonic. In addition to all the diseases in which ginger is indicated it is very useful in some nervous disorders as neuralgia functional impotence nervous debility &c. It has also proved useful in several cases of incontinence of urine. Its preparations and doses are the same as those of ginger to which it is also preferable in another respect *vis* that it is neither attacked by insects nor destroyed by any length of time. It is best administered in powder and tincture the latter being prepared exactly in the same manner as the tincture of ginger except the quantity of the root which is to be four ounces instead of two and a half. Doses of the powder from 10 to 30 grains and of the tincture from 30 minims to two drachms (*Honorary Surgeon Moodeen Sheriff Khan Bahadur Triplicane Dispensary Madras*)

I have not seen a specimen of the plant referred to above by Dr Moodeen Sheriff but from his description (which was published in the *Supplement to the Indian Pharmacopœia* 1869) it would seem to be the same plant which Dr Hance described in the *Linnæan Journal* Vol XIII p 6 1871 under the name of *A officinarum*. If this conjecture proves correct according to the rule of priority the information given under *A Khulanjan* and that which further on has been given under *A officinarum*, it would seem should be reduced to one place under the name of *A Khulanjan*, *Moodeen Sheriff*. The difference between the rhizomes of the Madras plant and the imported Chinese specimens might easily be due to the former being cultivated in India. Dr Moodeen Sheriff's description is scarcely a botanical one but the honour of associating his name with this plant would be a deserved recognition of his distinguished labours in the field of economic science. I have left the information given however under the two names until it can be ascertained whether the Madras garden plant is in reality the Chinese species described by Hance or not (*Compare with Hanbury's Science Papers* p 373)

A 859

The Lesser Galangal.

ALPINIA
officinarium**Alpinia nutans, Roscoe**

LIGHT GALANGAL

Vern.—*Punag champa* BENG *Kasta-serambet* PERS *Pa ga gys* BURM

Habitat—A native of the Eastern Archipelago found also in Burma Sylhet and on the Coromandel Coast much cultivated in Indian gardens

Botanic Diagnosis—*Leaves* lanceolar short petioled smooth *Racemes* compound by the lower pedicels being two or three-flowered drooping *Lip* (the labellum) broad three lobed the lateral lobes incurved into a tube the exterior curled and bifid *Capsule* spherical opening on the sides *Seeds* few (*Roxb Fl Ind Ed C B C p 22*)

Medicine—The rhizome is often used as a substitute for **A Galanga**, and even as a substitute for ginger It is much larger than the large galangal and not so pungent

860

MEDICINE
Rhizome
861

A. officinarum, Hance

THE LESSER GALANGAL ALPINIA CHINENSIS of Chemists

Vern—This is the article which is most frequently sold in the bazars under the names of *kuknyan* and *kolyana* o *pan ki jar* or *chandapushpi* *Chhota pan ki jar* *chota* or *choti kulyan* HIND BENG and BOMB *Shitta rattai* TAM *Chhot pan k jar* or *shle pan k jar* DUK Sanna *elumparash* *trakam* TEL *Khulanjan* ARAB *Khustro-daru* PERS

Habitat—The root stock is a native of China and is largely exported to Europe and India

Botanic Diagnosis—*Leaves* 9 14 inches long narrowly lanceolate much attenuated at the apex leathery bright green *ligule* oblong subacute decurrent at the base and along the margin of the sheath *Flowers* sessile closely packed in an erect dense terminal spike *bracts* three longer than the flowers the outer green the inner white calyx and corolla finely pubescent *Labellum* about $\frac{1}{2}$ inch long and broad ovate entire acute or bi-lobed crispid and denticulate white striated with dark-red veins which coalesce into a distinct in shaped spot near the apex

Medicine—This is the Galangal of the European shops In India it is generally known as the *Pan ki jar* It is stomachic tonic used by native practitioners to reduce the quantity of urine in diabetes Is said to correct foul breath when chewed and the juice swallowed is reputed to arrest irritation in the throat It is considered a nervine tonic and an aphrodisiac

The botanical source of this plant—the true or officinal Galangal—was determined in 1870 by Dr Hance who published an account of it in the *Journal Linn Society 1873, Vol XIII 6* (Compare with **A Khulanjan**.) Although a native of China it has been imported into India and used by the Hindu and Mohammedan physicians from time immemorial **Meer Muhammad Hussain** says that if given to infants it makes them talk early and that a paste of the powdered drug made with oil or water will remove freckles Galangal is one of the ingredients of *Warburg's Tincture* It is not used in English medicine but there is a considerable demand for it in Russia" (*Dymock Mat Med W Ind 637*)

D Hanbury (*Linn Soc Journ 1871* and in his "Science Papers p 373) says As a medicine the manifold virtues formerly ascribed to it (the lesser Galangal) must be ignored the drug is an aromatic stimulant, and might take the place of ginger as, indeed it does in some countries That it is still in use in Europe is evident from the exports from China and from the considerable parcels offered in the public drug sales of London The chief consumption however is not in

862

MEDICINE
The Rhizome
863

**ALPINIA
officinarium****Trade Returns of Galangal**

Flavouring
the Liqueur
Nastoulla
864
Spice
865
Cattle
medicine
866

England but in Russia It is there used for a variety of purposes such as for flavouring the liqueur called Nastoilla The drug is also employed by brewers and to impart a pungent flavour to vinegar As a popular medicine and spice it is much sold in Livonia Esthonia and in Central Russia and by the Tartars it is taken with tea It is also in requisition in Russia as a cattle medicine and all over Europe there is a small consumption of it in regular medicine

In concluding his interesting paper upon this drug Hanbury says ' According to Roudot writing in 1848 the trade in this drug is on the decline and the statistics which I have examined tend strongly to show that this is the fact The foregoing notes may thus be summarized —

- 1 Galangal was noticed by the Arab geographer **Ibu Khurdadbah**, in the ninth century as a production of the region which exports musk camphor and aloes wood
- 2 It was used by the Arabians and later Greek physicians and was known in Northern Europe in the twelfth century
- 3 It was imported during the thirteenth century with other eastern spices by way of Aden the Red Sea and Egypt to Akka in Syria whence it was carried to other ports of the Mediterranean
- 4 Two forms of the drug were noticed by **Garcia de Orta** in 1563 these are still found in commerce and are derived respectively from **Alpina Galanga, Willd** and **A officinarum Hance**
- 5 Galangal is still used throughout Europe but is consumed most largely in Russia It is also used in India and is shipped to ports in the Persian Gulf and Red Sea

867

Galangal (Foreign Trade by Sea)

| YEARS | IMPORTS | | EXPORTS AND RE EXPORTS | |
|---------|----------|--------|---------------------------|--------|
| | Quantity | Value | Quantity | Value |
| | Cwt | R | Cwt | R |
| 1879-80 | 3 129 | 25 503 | 1 817 | 17 668 |
| 1880-81 | 2 289 | 19 603 | 815 | 7 960 |
| 1881-82 | 3 813 | 29 625 | 1 971 | 15 986 |
| 1882-83 | 3 354 | 30 952 | 1 164 | 10 146 |
| 1883-84 | 3 870 | 35 982 | 1 670 | 13 306 |

Detail of Imports 1883-84

| Province into which imported | Quantity | Value | Countries whence imported | Quantity | Value |
|---------------------------------|--------------|---------------|------------------------------|--------------|---------------|
| | Cwt | R | | Cwt | R |
| Bengal | 686 | 7 831 | China—Hong Kong | 1 230 | 10 741 |
| Bombay | 1 750 | 14 897 | Straits Settle | 2 540 | 24,446 |
| Madras | 1 434 | 13 254 | ments | 100 | 795 |
| | | | Other Countries | | |
| TOTAL | 3 870 | 35 982 | TOTAL | 3 870 | 35 982 |

A. 867

| The Dita Bark. | | | | | | ALSTONIA scholaris |
|-----------------------------|----------|--------|--------------------------------|----------|--------|-----------------------|
| Detail of Exports 1883 84 | | | | | | |
| Province whence exported | Quantity | Value | Countries to which exported | Quantity | Value | |
| | Cwt | R | | Cwt | R | |
| Bengal | 51 | 339 | United Kingdom | 480 | 3 840 | |
| Bombay | 1 544 | 12 596 | Arabia | 397 | 3 730 | |
| Madras | 75 | 371 | Persia | 249 | 1 471 | |
| | | | Other Countries | 544 | 4 259 | |
| TOTAL | 1 670 | 13 306 | TOTAL | 1 670 | 13 306 | |

Note—It is impossible to say how far these trade returns refer to the Greater and Lesser Galangal respectively

ALSEODAPHNE, *Nees* **PERSEA** *Gærtn in Gen Pl*
III 157

868

Alseodaphne, ? sp **LAURINFÆ**

Vern.—*Dowki poma* Ass

Habitat—A tree met with in Assam

Structure of the Wood—Soft rcd even grained

Used for boats furniture and building

TIMBER
869

ALSTONIA, *R Br* *Gen Pl* II 705

870

A genus of trees or shrubs belonging to the APOCYNACEÆ (the Dogbane family) in the tribe CERBEREÆ. There are about 30 species in the genus inhabitants of tropical Asia the Malaya and Australia

Leaves 3-4 nately whorled rarely opposite **Calyx** short 5 lobed or partite glandular within **Corolla** salver shaped throat naked annulate or with reflexed hairs **lobes** overlapping to right or left **Stamens** near the top of the tube included **anthers** subacute **Carpels** two distinct **Follicles** 2 linear seeds many and many seriate in each carpel oblong flattened peltately attached often ciliate (or comose) on both ends **cotyledons** oblong flat **radicle** superior

The generic name is in honour of Alston once Professor of Botany Edinburgh

Alstonia scholaris, *R Br Fl Br Ind* III 642

871

Commercially known as DITA BARK

Vern—*Chatwan chhatin, chatun* BENG *Satiun chatun satwin satni* HIND *Sapta-parna* SANS *Chhatma* URIYA *SANTAL*, and *MAL* (S P) *Chatin bomudu* KOL *Chatwan* NEPAL *Purbo* LEPCHA *Satsana chatian* ASS *Satwin* BOMB *MAR* *Sattni* CACHAR *Eshlarp-palai* modrase TAM *Edakula-pala pala garuda* *edakula ariti, edd kula-ponna* TEL *Mukampala pala* MAL *Janthalla* KAN *Ruk attana* SINGH *Chaile chalaun* MAGH *Let top toungmayobeng* BURM

Dr Rice thinks that *Sapta chhada* and *Sapta parna* (seven leaf) are ancient Sanskrit names for this tree **Dr Moodsen Sheriff** says the Singhalese name *ruk attana* is sometimes given to it *attana* is however the name for *Datura* **Dr Trimen** informs me however, that *ruk attana* is the correct Singhalese name for this tree

Habitat—A tall evergreen tree widely cultivated throughout India,

A. 871

**ALSTONIA
scholaris****The Dita Bark**

Caoutchouc
872
MEDICINE
The Bark
873

and found in the Sub Himálayan tract from the Jumna eastward ascending to 3 000 feet in Bengal Burma, and South India Distributed to Java Tropical Africa, and Eastern Australia An exceedingly useful as it is a highly ornamental tree

Botanic Diagnosis—*Leaves* 4 7 in a whorl ovate or elliptic oblong white beneath 4 to 8 by 1 to 2½ inches nerves 30 60 pairs joining an intra marginal one base acute tip obtuse or obtusely acuminate *cymes* peduncled or sessile umbellately branched or capitate *corolla* white pubescent throat villous lobes rounded *Follicles* very long and slender

Properties and Uses—

Caoutchouc—It yields an inferior quality of Caoutchouc or Gutta percha the *Gutta pulei* of Singapore, which see under **Caoutchouc**

Medicine—The bark is used medicinally as an astringent tonic, anthelmintic alterative and antiperiodic It is a valuable remedy in chronic diarrhoea and the advanced stages of dysentery It is also useful in catarrhal fever The milky juice is applied to ulcers and mixed with oil is put into the ear in earache It has also been found most useful in restoring the tone of the stomach in debility or after fever *Ditain* the uncrystallizable substance obtained from the bark is reported to be equal in efficacy to the best sulphate of quinine while being free from the disagreeable secondary symptoms of that drug

Description of the Bark—The drug consists of irregular fragments of bark ½ to ¾ inch thick easily breaking with a short fracture The external layer fissured dark grey or brownish sometimes with black spots it readily separates when handled Inner substance of a bright buff It has no smell is bitter but not disagreeable when chewed (*Official Report of the Bombay Committee regarding a future edition of the Pharmacopœia of India*)

Official Preparations and Dose—*Preparations*—An infusion a tincture and the dry powdered bark also the active principle *Ditain*

Doses—Of the powder 3 5 grains combined with ipecacuanha and with the infusion of gentian used for bowel complaints Of the infusion 1 2 ounces of the tincture 1 2 drachms The active principle may be given in from 5 10 grain doses repeated every 3 4 hours not exceeding 1 drachm daily

Chemical Composition—§ The bark of *A. scholaris* has been frequently examined Gruppe an apothecary of Manilla separated an uncrystallizable bitter principle which he called *Ditain* and to which he ascribed the febrifuge properties of the drug *Sorup Bosaneri* obtained from ditain a crystallizable substance which possessed all the properties of an alkaloid The bark was next examined by J Jobst and O Hesse who isolated the following an alkaloid *Ditamia* another substance the nature of which as an alkaloid was not clearly established a crystallizable acid as well as a fatty acid and fatty resinous substances The fatty resins have been named *Echicaoutchin Echicerin Echutin* or *Echitein* and *Echiretin* and a fifth resin not fully investigated Hesse continuing his investigations, subsequently discovered two other alkaloids in addition to *Ditamine* i.e., *Echitamine* and *Echitenine*

The *A. constricta*, an Australian species and the *A. spectabilis*, or *poclé* bark of Java have also been examined by Hesse From the bark of the first mentioned variety he isolated *Alstonine* or *Chlorogenine* *Porphyrrine*, *Porphyrosine* and *Alstonidine* The alkaloids contained in *poclé* bark are thus present in the *A. scholaris*, together with a fourth, *Alstonidine* In a report on the Centennial Exhibitions presented to the American Pharmaceutical Association 1877 it is stated that equal doses of ditain from the *A. scholaris* and sulphate of quinine have the same medicinal effects, while the disagreeable secondary symptoms

DITAIN
874

The Marsh Mallow

ALTHÆA
officinalis.

which so frequently follow the administration of a large dose of quinine are absent

"The results arrived at in the Manila hospitals and in private practice with ditain are described as simply marvellous. The report further adds that in military hospitals and in penitentiary practice (*Manilla*) ditain has perfectly superseded quinine and is now being largely employed with most satisfactory results in the Island of Mindanao where malignant fevers are prevalent (*Surgeon Warden Professor of Chemistry Calcutta*)

Special Opinions — § The tender leaves roasted and pulverised and made into poultices act as a useful local stimulant to unhealthy ulcers with foul discharges (*Surgeon Major D R Thompson Madras*)

Structure of the Wood — White soft even grained seasons badly and soon gets mouldy and discoloured. It is not durable but is easily worked. Weight about 28 lbs per cubic foot

It is used for boxes furniture scabbards coffins &c. In Burma it is made into blackboards and in Darjeeling Assam and Cachar is occasionally used for tea boxes

TIMBER.
875
Boxes and
Furniture.
876

ALTERNANTHERA

Alternanthera sessilis, R Br AMARANTACEÆ (which see)

Vern — *Mokū nu wanna* SINGH

Food — Dr Trimen writes me that this is largely eaten in Ceylon as a vegetable especially by mothers to increase the flow of milk also used as a wash for the eyes

877

FOOD
878

ALTHÆA, Linn Gen Pl I 200

A genus of sub bushy herbaceous erect or procumbent plants belonging to the Natural Order MALVACEÆ inhabitants of the temperate regions 12 known species

Althæa classical Latin name for the Marsh Mallow ἀλθαία Gr

879

Althæa officinalis, Linn Fl Br Ind I 9 MALVACEÆ

THE MARSH MALLOW, Eng GUIMAUVE Fr ALTHIEWURFL
EIBISCHWURZEL, EIBISCH Germ ALTEA It ALTEA
MALVA VISCO Sp

880

Vern — *Gul kharo Khitmi ka jhār khasra ka jhor* PERS HIND DUK
and BOMB *Gulkhair* MAR GUJ and CUTCH *Shīmai tutti* TAM
The fruits are *Tukm i khitmi* PERS and BOMB the roots *Résha-i khitmi* PERS and BOMB

Habitat — A native of Kashmīr and the Panjāb Himalaya

Dye — Often cultivated in Indian gardens for its flowers rarely for its dye — a rich blue obtained from the leaves *A rosea*, Linn the HOLLY HOCK yields the dye even more freely than *A officinalis*, L it is met with plentifully in Kashmīr

DYE
881

Information as to whether this dye is actually prepared in India would be exceedingly interesting

Medicine — This plant was held in great esteem by the Greeks and Latins for its healing properties. The Mohammedans also describe it as a suppurative and emollient they use the leaves in the form of poultice. The leaves and flowers mixed with oil form an application to burns and venomous bites. A decoction of the root with sugar is given in cough and irritation of the intestines and bladder (*Dymock*)

MEDICINE
Leaves
882
Flowers.
883
Root
884

A. 884

ALTINGIA

A form of the Resin Storax.

§ The juice of the leaves boiled to a proper consistence with castor oil in equal parts is given internally in parasitic affections of the skin (*Surgeon Major R Thompson M D Madras*) The boiled leaves are in common use in Ceylon as a local application to sprains bruises and other injuries (*Surgeon W H Morgan Cochin*) The boiled leaves are used as an emollient and suppurative by native hakims (*Honorary Surgeon Easton Alfred Morris Negapatam*) An excellent application for ulcers (*Surgeon W Barren Bhuj Cutch*) Is not known to the inhabitants of Kashmir as medicinal but I have there used the leaves in a poultice Very common in the Sind Valley near streams (*Surgeon George Cumberland Ross Delhi*) The leaves are useful as a fomentation to relieve pain and itching (*Surgeon Major Henry David Cook Calicut Malabar*)

The powdered seeds are employed in cases of gravel from the kidneys Chewing the leaves is said to allay thirst Root bark acts as a purgative and is used in colic An infusion of root barks has also been used as an eye wash with success Seeds dissolved in vinegar are employed generally to remove toothache (*Assistant Surgeon Gholam Nabi*)

Food — Is used as a green vegetable

FOOD
885

886

Althæa rosea, L Fl Br Ind, I, 319

THE ENGLISH HOLLY HOCK *Eng* GUIMAUVE *Fr*

Habitat — Largely cultivated in Indian gardens flourishing freely at all hill stations it probably bears the same vernacular names as have been given above for the MALLOW

Medicine — The SEEDS of this plant are demulcent diuretic and febrifuge The FLOWERS have cooling and diuretic properties The ROOTS are supposed to be astringent and demulcent and are much used in France to form demulcent drinks Boiled with sugar they yield a decoction largely used in India in the treatment of coughs and irritable conditions of the intestines and bladder (*Dymock*) The LEAVES are used as a poultice or fomentation and mixed with oil are applied to burns or sores caused by snake bites

§ '*Althæa officinalis* and *A rosea* are cultivated in many gardens in Madras for medicinal and ornamental purposes The fresh petioles stems and roots of both plants yield a mucilage when bruised broken and shaken in water The mucilage is cooling demulcent and a very useful adjunct to other medicines in dysentery In mild cases it is sufficient by itself to relieve some dysenteric symptoms as tormina and tenesmus Dose of the mucilage from one ounce to two ounces If used alone it should be repeated frequently (*Honorary Surgeon Moodeen Sheriff Khan Bahadur Madras*)

MEDICINE
Seeds
887
Flowers
888
Roots
889
Leaves
890

891

ALTINGIA, *Noronha Gen Pl, I 669*

A genus of trees containing only 2 species (belonging to the Natural Order HAMAMELIDÆ)

Leaves alternate persistent petioled ovate or oblong glandularly serrate *stipules* deciduous or persistent *Flowers* in dense heads heads enclosed by a large bract males racemose females solitary *Male* heads a mass of stamens with very short filaments *anthers* obverse-pyramidal the valves when young thrown inwards so as to become pseudo 4-celled dehiscing longitudinally *Female* heads of 12 20 flowers *Calyx* confluent teeth absent but with rudimentary anthers inserted on the rim *Ovary* $\frac{1}{2}$ inferior 2-celled *carpels* prolonged into 2 distinct deciduous styles *ovules* numerous on an axile placenta *Fruiting head* globose harsh many-capsuled *seeds* imperfect the lowest winged and fertile the upper without wings and sterile

A 891

| Alum. | ALUMEN |
|---|---|
| The genus is named after the botanist Altingia there is only one species met with in India — | |
| Altingia excelsa , <i>Noronha Fl Br Ind II 429</i> | 892 |
| Syn — LIQUIDAMBER ALTINGIA Bl | |
| Vern — <i>Silaras</i> HIND and <i>DUK Jutli</i> ASS <i>Méaahé sayelah</i> ARAB <i>Asle lubni</i> PERS <i>Neriuriship-pal</i> TAM <i>Shila rasam</i> TEL <i>Rasa málá</i> MAL <i>Silaras</i> GUJ <i>Shilaras</i> MAR <i>Nan ta yok</i> or <i>nan ta yu</i> BURM | |
| Habitat —A magnificent tree of the tropical evergreen forests of the Indian Archipelago Burma Assam and Bhutan abundant in the Tenasserim Province of Burma | |
| Gum —In Java it yields in small quantity an odorous resin known in Europe under the name <i>Storax</i> which is obtained by incisions in the trunk the tree is not regularly cultivated In Burma it is said (in the <i>Pharmacographia</i>) to afford a fragrant balsam of two varieties one pellucid and of a light yellowish colour obtained by simple incision and the other dark opaque and of a terbinthinous odour procured by boring the stem and applying fire around the trunk | RESIN Storax Pellucid form 893 Opaque form. 894 |
| Medicine —Yields a form of the resin known in Europe under the name <i>Storax</i> For medicinal properties see <i>Liquidamber orientalis</i> Miller | MEDICINE Storax 895 |
| § In orchitis a very thin layer of storax is laid on a tobacco leaf and applied to the inflamed part (<i>Surgeon Joseph Parker Poona</i>) | |
| Structure of the Wood —Soft reddish grey with lighter streaks Annual rings marked by a narrow belt of firm wood without pores Weight 46 lbs per cubic foot | TIMBER 896 |
| Used in Assam for building and ordinary domestic purposes | |
| ALUMEN | 897 |
| Alumen or Alum | |
| Vern — <i>Phatikar</i> HIND <i>Phatikar</i> BENG <i>Sphatikari</i> SANS <i>Shib mdy</i> ARAB <i>Zak muke safed</i> PERS <i>Phatki turki patakri</i> MAR <i>Patí karam</i> TAM ; <i>Patí karam</i> TEL <i>Patik karam</i> MAL <i>Keo khin</i> or <i>kyankchin</i> BURM | |
| Preparation of Indian Alum —Alum is prepared from alum shale in Behar in Cutch and in the Panjab It is often met with in different shades of colour—white yellow red and black depending upon impurities | |
| In the <i>Bombay Gazetteer Vol V pp 19 20</i> is given an interesting account of the manufacture of alum in Cutch It is said to have been carried on for the past two or three centuries During certain months of the year a large quantity of alum is made at Madh The material used is pyritous dark grey or black shale closely associated with a soft aluminous pseudo-breccia of the sub nummulitic group This appears to overlie or enclose the shale or to have invaded it The native burrowings give a poor chance of studying the relations of the rocks the air in them is exceedingly bad and it is difficult to obtain light and much of the ground may have been disturbed by <i>old men's</i> workings which according to <i>Colonel Grant</i> fall in every year Each work is entered by a narrow passage the sides cut vertically the floor sloping About 20 feet below the surface the open air passage stops and an underground gallery about 6 feet high and from 3 to 4 feet wide slopes down to the alum bed through which, owing to the accumulation of water no passage has ever been driven | Cutch Shale. 898 |

| ALUMEN | Alum. |
|--------------------------------|---|
| Alum Seed 899 | The alum earth is dug out and exposed for months in heaps. It is then spread in squares and sprinkled with water. After about 12 days it consolidates into efflorescing and mamillated crystalline plates of sulphate of alumina, called alum seed, <i>phatakari ká bin</i> or <i>turr</i> . These plates are boiled in water mixed with salt potash in the proportion of 15 parts of the sulphate of alumina to six of the salt potash. Before the salt potash has time to dissolve, the fluid is ladled into small earthen vessels, crystallization taking place in less than two days. These crystals are again boiled to concentrate the solution which is finally ladled into large bladder shaped earthen jars <i>matkas</i> , sunk in the ground to prevent breaking. The alum in each jar forms a solid crystal in about four days. |
| Alum Matka 900 | |
| Cutch Alum 901 | In 1867 the yearly outturn of Cutch alum was estimated at about 294 tons. But after 1867 owing partly to an idea that Cutch alum tinges cloth and partly because the working of the mines was a mismanaged monopoly the demand for Cutch alum almost entirely ceased. The Bombay Chemical Examiner analysed Cutch alum in 1878 and according to him it is better than either English or Chinese alum as the Cutch alum contains only 13 per cent. of impurities and 10.73 per cent. of alumina being 0.12 per cent. less than the theoretic quantity. The Cutch State has lately discontinued the monopoly of the mines and begun to sell the alum on its own account. |
| Sind Alum 902 | Irvine in his <i>General and Medical Topography of Ajmere</i> published in 1841 says that alum comes from Sind where it is made about 300 camel loads annually arrive. red alum is brought from Lahore used in medicine as an astringent but chiefly employed in dyeing one maund for Rs 10. |
| Panjab Alum Kalabagh 903 | Baden Powell in his <i>Panjab Products</i> says that European alum is white and pure, and is on that account preferred to Indian alum in medicine. Bituminous shale yielding more or less alum, is abundant all through the Salt range in the Panjab although the manufacture is confined to two places—Kálábagh and Kutki. The alum made at Kálábagh is always of a pinkish colour due to the presence of chloride of iron. It is remarkable that the alkaline base of Kálábagh alum is soda while that of English alum is potash. The shale strata at Kálábagh are nearly 200 feet thick. The shale is very soft and contains a large amount of iron pyrites in crystalline nodules. The red mound like alum kilns form a striking feature at Kálábagh. In making an alum kiln layers of brushwood generally <i>jhau</i> or <i>pilchi</i> (<i>Tamarix</i>) are spread on the ground then a layer of alum shale is laid upon them then more brushwood and so on the half formed pile is lighted first and subsequently more layers of shale and brushwood are added till the pile reaches a height of 20 to 60 feet. A pile takes 6 or 8 months to burn. The calcined shale is next lixiviated with water in large tanks of baked earth about 12 feet square and 18 inches deep. The liquid is after some time allowed to flow off into a similar tank at a lower level where it deposits by subsidence its mud and impurities and is again drawn off into a third vat. It is then poured into iron evaporating pans and mixed with a dirty looking salt called <i>jamsan</i> which appears to be similar to the saline efflorescence of <i>reh</i> lands and consists of sulphate of soda with a little common salt and a very little carbonate of soda. The alkali contained in <i>jamsan</i> converts the solution into the alum of commerce. When the mixture has settled the solution appears as a clear brown fluid and is drawn off to be evaporated in vats under a shade where the alum is formed in crystals of a pink colour. These crystals are next washed slightly with cold water on strainers of <i>sirki</i> grass after which they are liquified by heat in iron pans. The liquid is poured into earthen jars where it again crystallizes. The |
| Jamsan Salt 904 | |

| Alum as Medicine. | ALUMEN |
|---|---|
| <p>contents of the jar broken into lumps form the alum of commerce The manufacture appears to have been carried on at Kálábagh for many generations</p> | |
| <p>The alum works at Kutki across the Chichalli range is of much more recent date than at Kálábagh The cost of manufacture at Kutki is less than at Kálábagh owing to the shale being cheaper and the fees lower at the former place</p> | <p>Kutki 905</p> |
| <p>There is no difference in the quality of the alum produced at Kálábagh and at Kutki but the value of Kálábagh alum is ₹3 4 a maund on the spot while Kutki alum sells at ₹2 8 About 12 000 maunds of alum are made annually at Kalabagh and 10 000 maunds at Kutki It is exported to all parts of India³ (<i>Baden Powell Panjab Products Vol I p 84</i>)</p> | |
| <p>§ According to Dr Brandis alum can be obtained from shale which exists in abundance in the Shwegyin district in Burma (<i>J C Harding Esq Secy Agri Horticultural Society Rangoon</i>)</p> | <p>Burma Shale. 906</p> |
| <p>Mordant—It has been found difficult to obtain any very definite information regarding the Indian trade in this valuable salt Mr E O Buck says it is imported into the North West Provinces from Calcutta and is much used as a mordant in dyeing especially with madder and turmeric Potash alum is largely imported into Bombay from Europe (<i>Dymock</i>)</p> | <p>Burma Alum 907 MORDANT 908</p> |
| <p>Medicine—In the <i>Indian Pharmacopœia</i> this substance has been described as astringent styptic and antiseptic Used internally in passive hæmorrhages atonic diarrhœa infantile cholera catarrhal affections of the stomach colica pictonum whooping cough and bronchorrhœa in the form of lotion or powder as a local application for catarrhal ophthalmia granular eyelids and many other diseases of the eye in leucorrhœa gonorrhœa menorrhagia prolapsus of the uterus and rectum and ulcerations Burnt powdered alum is used as a snuff to stop bleeding from the nose</p> | <p>MEDICINE 909</p> |
| <p>Chemical Note—"The officinal alum of the <i>Indian Pharmacopœia</i> is a double sulphate of alumina and ammonia Several other alums are known of different bases such as potash soda iron &c replacing ammonia in the salt It is probable that the burnt alum which so frequently enters into native doctors' nostrums is often useless from too high a temperature having been employed in its preparation Above 400 Fahr alum is decomposed—inert and insoluble alumina remaining (<i>Surgeon C F H Warden Professor of Chemistry Calcutta</i>)</p> | |
| <p>Special Opinions—§ It is useful in aphthæ ulcerated sore-throat spongy gums salivation chronic ulcers (<i>Brigade Surgeon F H Thornton B A M B Monghyr</i>) It has been recommended as useful in relieving the pain caused by a carious tooth (<i>Surgeon G F Poynder Roorkee</i>) The domestic use of alum is to clear water It is a strong cement when liquified by boiling (<i>Assistant Surgeon T N Ghose Meerut</i>) It is used as a gargle in relaxed and inflamed throat (<i>Brigade Surgeon G A Watson Allahabad</i>) Burnt alum is some times very effective as an external application to scorpion bite (<i>Surgeon Joseph Parker M D Poona</i>) If after the umbilical cord has dropped off there be any ulceration of the navel a little burnt alum sprinkled over the part will effect a speedy cure (<i>Surgeon W Wilson Bogra</i>)</p> | |
| <p>Found beneficial in early abortions where a difficulty exists to extract the debris it also lessens hæmorrhage Should be used in the following manner finely powdered alum placed in a muslin bag (the size of a walnut or large sized marble) with a long thread attached to hang out of the passage This is introduced into the vagina as far as the os uteri and left there for 24 hours Should no irritation be felt, the bag can</p> | |
| | <p>A 909</p> |

AMARANTACEÆ.

Amarantaceous Herbs.

MEDICINE

be left for another 24 hours after which in its removal the debris will be found lying in the passage and can easily be removed (*Honorary Surgeon Peter Anderson Guntur Madras Presidency*) This and the decoction of babul bark is useful in dysentery used as injection (*Surgeon Major P N Mukerji Cuttack Orissa*) A piece of alum burnt and applied to the part stung by a scorpion allays the pain rapidly Burnt alum mixed with lime juice is a useful remedy in ophthalmia (*Surgeon Major John Lancaster Chittore*) Alum is one of the best remedies for whooping-cough, but it seems to have gone out of use lately For this purpose it should be given in doses of from 10 to 20 grains three times a day (*Surgeon General William Robert Cornish F.R.S. Madras*)

Useful in doses of 5 grains in diarrhœa and latter stage of dysentery combined with opium Useful astringent lotion in conjunctivitis and purulent ophthalmia (alum 4 grains rose water one ounce) also in gonorrhœa and gleet (*Assistant Surgeon Shub Chunder Bhuttacharji Chanda Central Provinces*)

910

ALYSICARPUS, Neck Gen Pl I 522

A genus of annual or biennial spreading or erect herbs comprising about 15 species (belonging to the Natural Order LEGUMINOSÆ)

Leaves simple rarely 3 foliolate stipulate subcoriaceous *Flowers* in copious axillary racemes *Calyx* glumaceous *teeth* deep often imbricated the two upper frequently connate *Corolla* not exerted *standard* broad *keel* obtuse adhering to the wings *Stamens* diadelphous *anthers* uniform *Ovary* nearly or quite sessile many ovuled *style* incurved *stigma* capitate *Pod* terete or turgid composed of several indehiscent 1 seeded joints

911

Alysicarpus vaginalis, DC var *ummularifolius* Fl Br Ind II, 158

Vern — *Nag bala* (*Stewart s Pb Pl 57*) **Sakhâram Arjun** says that in Bombay *Nag bal* is the name for SIDA ALBA

Habitat — Himalaya to Malacca and Ceylon ascending to 4 000 feet in the North West Provinces

MEDICINE

912

Medicine — This may be the officinal plant referred to by some authors information very imperfect

913

AMARANTACEÆ

A Natural Order of herbaceous or suffrutescent glabrous pubescent or woolly plants erect sparsely branched or scandent *Leaves* opposite or alternate simple usually entire membranous or fleshy exstipulate *Flowers* small scarious dichinous or hermaphrodite rarely polygamous sessile solitary or in glomerulate heads or spikes the lateral ones sometimes arrested or developed only into crests awns or hooked hairs *Bracts* three the lateral smaller often keeled the central and lowest large sometimes leafy *Calyx* 4 5 sepals (in Mengea) distinct or coherent at the base erect equal or sub equal (2 3 interior sepals smaller) green scarious rarely petaloid persistent imbricate in æstivation *Corolla* wanting *Stamens* hypogynous inserted at the base of the sepals 1 5 fertile included or early exerted opposite the sepals (rarely fewer) with or without alternate staminodes all free or united below forming a cup or tube *filaments* filiform subulate or dilated sometimes 3 fid *staminodes* entire or fringed flat or rarely concave sometimes very small and toothed *anthers* introrse 1 2 celled dorsifixed dehiscing longitudinally *Ovary* free ovoid or globose compressed rarely depressed 1 carpelled and 1 celled *style* terminal simple sometimes obsolete *stigma* capitate emarginate or two or more lobed or 2-3 fid *Ovule* solitary erect or suspended from an ascending funiculus *Fruit* usually enveloped in the calyx sometimes membranous a 2 or more seeded utricle bursting by circumsciss dehiscence or irregu-

A 913

Amarantaceae Herbs.

AMARANTACEÆ.

larly rarely a berry Seeds usually compressed reniform testa crustaceous black shining *hilum* naked or early arillate albumen abundant *Embryo* peripheric annular or curved *cotyledons* incumbent *radicle* near the *hilum* inferior or sub ascending

Affinities of the Order—The Amarantaceæ have their closest affinity with the Chenopodiaceæ the latter differing chiefly in habit and in having distinct styles and a herbaceous calyx

Its Habitat—There are 480 species in the whole world referred to this Natural Order and they are mostly tropical or extra tropical plants taking the place in the tropics of the Chenopodiaceæ which extend into the temperate regions In India there are a little over 80 species chiefly extra-tropical or if met with in the tropical regions they are annuals which appear or are cultivated in the plains during the cold season only A few species are strictly tropical and these compensating for the sparsity of forms make up in abundance of individuals since they are perhaps the most plentiful weeds on roadsides and waste places met with in the plains of India The Indian species are referred to 15 genera of these the genus *Amarantus* contains 27 species and 17 occur in *Ærua* and *Achyranthes*—two genera the species of which are undoubtedly the most typical and prevalent Indian representatives of the order It is not far from correct to say that the Amarantaceæ attain their maximum development in the tropical regions of the New World the greatest number of species perhaps occurring in Mexico There are few species in the temperate zones and none in cold countries some 5 or 6 species only being met with in Europe

DeCandolle (in *L Orig des Pl Cult*) very truly remarks that all the species of Amarantus spread themselves on cultivated lands among rubbish heaps and on roadsides and have thus naturalised themselves in most warm countries as well as in Europe hence great difficulty exists in distinguishing the species and above all in guessing or proving their origin

The following brief classification of the Indian genera may be found useful it will at least serve to direct attention to the respective alphabetical positions where fuller details will be found regarding the more important members of this order It is necessary to explain however that the information given is of the most meagre kind since there is perhaps no family of Indian economics regarding which greater confusion exists Most writers give the information published by them under vernacular names only and the few authors who do associate these vernacular names with the scientific names for the plants referred to are unfortunately most conflicting in their statements so that it has been found next to impossible to arrive at any satisfactory conclusion It is hoped that this confession which must of necessity run through the greater portion of the present work but which is specially true with regard to the Amarantaceæ may call forth new material based upon the present attempt at grouping scientifically the available economic information For museum purposes it is absolutely necessary that all collections of Amarantaceous food stuffs or drugs be accompanied with dried specimens of the plants from which they are obtained together with the various vernacular names given to these plants Were such collections to be made by the local authorities there would then be no difficulty in having the present confusion regarding the Amarantaceæ completely removed and this much to be desired result would without doubt prove most convenient and valuable both to the cultivator of the soil and to the administrator since in times of scarcity and famine few sources of food are more valuable than the various forms of Amarantaceous grains They reach maturity in little more than two months, and require scarcely any rain so that they often succeed when other crops fail That confusion and ambiguity should exist in official

AMARANTACEÆ.

Classification of the Amarantaceæ.

correspondence regarding plants of such importance to India is much to be regretted. The conflicting opinions in vernacular and botanic names applied to the species of economic interest render it impossible to do more than indicate the probable species to which the Indian forms belong and it is difficult from available literature to arrive at any conclusion regarding the vernacular which should be associated with the scientific names. For example it may be mentioned that in the Introduction to Part I of Duthie and Fuller's *Field and Garden Crops p v* in a list of crops are found the words *ramdana* (*Amarantus frutescens*). What is *Amarantus frutescens*? DeOandolle gives it as a synonym for *Iresine amarantoides*, a plant apparently not met with in India while Moquin places it under *Species non satis notæ*. According to Duthie and Fuller it is one of the *rabi* crops of the North West Provinces.

914

CLASSIFICATION OF THE INDIAN AMARANTACEÆ

[NOTE—Fuller details of the genera marked * will be found in their respective alphabetical positions]

TRIBE I—CELOSIEÆ

Anthers 2 locular *Ovary* 2 many ovuled *Leaves* alternate.

SECTION 1ST—*Fruit* a berry *perianth* spreading *stalked*

1 *Deeringia*—Flowers racemose

This genus is now made to include the species formerly referred to *Deeringia* and *Cladostachys*. The following are the commoner species—

D *baccata*, Moquin *Wight, Ic t 728*

Syn—D INDICA Spreng D CELOSIODES R Br Roxb Fl Ind Ed
C B C 229

Vern—Latman HIND *Gola mohant* BENG

Habitat—An extensive climber very common in Bengal covering the *babul* trees with its racemes of small scarlet berries which ripen from December to January. Apparently not put to any economic use.

D *muricata*, formerly *Cladostachys muricata*, Moquin and *Achyranthes muricata*, Linn

D *tetragyna*, Roxb *Wight, Ic, t 729*

SECTION 2ND—*Fruit* membranous *perianth* erect

2* *Celosia*—Filaments connate at the base fruit bursting by circumsciss dehiscence

TRIBE II—AMARANTEÆ

Anthers 2 locular *Ovary* 1 ovuled

Sub-tribe 1 EUAMARANTEÆ—Ovule erect funicle short, radicle inferior *Leaves* alternate

SECTION 1ST—*Flowers* hermaphrodite or dioecious *Perianth* segments spreading in fruit

3 *Rodetia*—Flowers 2-4—bracteolate

SECTION 2ND—*Flowers* hermaphrodite *Perianth* segments erect in fruit

A 914

Classification of the Amarantaceæ.

AMARANTACEÆ

4 Banalia —Flowers in paniced spikes Stigma 2. Fruit membranous indehiscent Arillus absent

B thrysiflora, *Moquin* a native of the Nilgiri Hills **Achyranthes thrysiflora** *Wall* A herbaceous climber

5 Allmania —Herbaceous plants Flowers capitate Stigma capitate Fruit bursting by circumsciss dehiscence Seed arillate. The following are the principal Indian species —

A esculenta, *R Br* Singapore

A nodiflora, *R Br* Coromandel

6 * Digera —Herbs Flowers spicate Stigma 2 fid Nut crustaceous

SECTION 3RD —Flowers unisexual Perianth segments erect in fruit

7 * Amarantus —Flowers most frequently monœcious Fruit various

This genus is now made to include the species formerly referred to the following genera **Amarantus** **Amblogyne**, **Mengea**, and **Euxolus**

Sub-tribe II ACHYRANTHÆ —Ovule suspended from the apex of an elongated funiculus Fruit indehiscent Seed inverted radicle ascending or superior

SECTION 4TH —Flowers hermaphrodite 1 3 perfect and bracteate the others imperfect and stipulate

8 Cyathula —Flowers forming fascicled or capitate spikes Staminodes or teeth ascending from the connate base of the filaments Leaves opposite The following are the principal Indian species —

C capitata, *Moquin*

C prostrata, *Blume Wight Ic, t 733 Roxb Fl Ind, Ed C B C 226*

C tomentosa, *Moquin*

9 Pupalia —Flowers forming simple or paniced spikes perfect flowers solitary amongst the imperfect ones Staminodes absent Leaves opposite The following are the Indian species —

P atropurpurea, *Moquin Wight, Ic t 731*

Vern —*Dunya khuya* BENG

P lappacea, *Moquin*

P velutina, *Moquin*

SECTION 5TH —Flowers hermaphrodite solitary 2 bracteolate Interfilamentary teeth absent

10 Psilotrichum —Exterior segments of the perianth thick 3 costate Herbs or under shrubs with opposite leaves and dense-flowered axillary spikes The following are the Indian species —

P ferrugineum, *Moquin (? Endl) Wight, Ic, t 721, Achyranthes ferruginea, Roxb, Ind Ed, Wall*

P nudum, *Moquin*

P trichotomum, *Blume*

11 Ptilotus. —Perianth segments free, thin transparent Leaves alternate

AMARANTUS.

The Amarant.

12 * *Ærua* —Perianth segments hairy Teeth short Herbs or under shrubs (lanate) leaves opposite or alternate

13 * *Achyranthes* —Perianth after flowering deflexed segments and bracts spinescent Herbs with opposite leaves flowers in long lax spikes This genus is now made to include *Achyranthes* and *Centrostachys*.

TRIBE III —GOMPHRENEÆ

Anthers 1 locular *Ovule* suspended from the apex of a prolonged funiculus which ascends from the base of 1 celled ovary *Leaves* generally opposite

SECTION 1ST —*Stigma simple capitate*

14 *Alternanthera* —Flowers hermaphrodite capitate axillary rarely terminal solitary or 2 5 Staminal tube nearly as long as the ovary stamens 3 (rarely 5) staminodia nearly as long as the filaments Ovary orbicular compressed (See page 199)

The above definition has been restricted to the characters of the Indian representatives of the genus which form a small section or subgenus by themselves

A. denticulata, R Br

A. nodiflora, R Br DC Prod XIII 2nd 356 Thw En Cyl Pl 350

A sessilis, R Br Wight Ic t 727

Syn —GOMPHRENA SESSILIS Linn ALTERNANTHERA TRIANDRA Lam
ACHYRANTHES TRIANDRA Roxb Fl Ind Ed C B C 227

Vern —Shanchi BENG Moku nu wanna SINGH

SECTION 2ND —*Stigma 2 subulate or filiform*

15 *Gomphrena* —Perianth often softly hairy or lanate segments free or united at the base Staminal tube elongated antheriferous teeth 5 Inflorescence capitate or hemispheric bracts lateral concave fleshy crested on the back Under shrubs with opposite generally semi amplexi caul leaves

G globosa, Linn

THE GLOBE AMARANT

Common in Indian gardens There are two varieties—*Lal gul makmal* BENG or the crimson form and *Safed gul makmal* the yellowish white form

The Globe Amaranth is one of the most prolific and ornamental flowers in the Indian flower garden largely cultivated by natives Flowering time the rainy season

AMARANTUS, Linn Gen Pl III 28

A genus of tropical plants belonging to the Natural Order AMARANTACEÆ comprising some 45 species of which 27 are most probably natives of India

Leaves alternate contracted at the base ovate lanceolate or linear entire or rarely sinuate-dentate apex often mucronate *Flowers* minute monœcious or polygamous bracteate arranged in dense axillary or terminal paniced spikes *Perianth* segments 5 rarely 1 3 membranous equal or subequal in the male ovate lanceolate in the female oblong white or coloured generally purplish red thickened at the base erect in fruit *Stamens* 5 rarely 1 3 filaments subulate free *Ovary* ovoid compressed *style* short or wanting *stigmas* 2 3 subulate or filiform and papillose *Ovary* 1 sub-sessile, erect

A 915

Forms of *Amarantus* in India.

AMARANTUS

fruit often included by the persistent perianth orbicular or ovoid compressed indehiscent or opening by a circumsciss membranous or coriaceous apex, simple or 2-3 dentate

This genus according to the *Genera Plantarum* includes the species formerly referred to *Euxolus*, *Mengea*, and *Amblogyne*, as well as to *Amarantus* proper

The generic name is derived from the poetic flower the Amarant supposed never to fade *Amaranth* GR *Amarante*, FR, *Amaranto* IT SP and PORT *Amarantus* LAT and *amapavros* GR, non fading (from α and $\mu\alpha\pi\alpha\lambda\upsilon\omega$ to quench)

O'Shaughnessy says that nearly all the species of *Amarantus* "may be used as emollients for enematæ cataplasms diluents and drinks". These properties doubtless depend upon the amount of nitre which they contain Boutin found that *A. Blitum* yielded for 100 parts of the plant 11.68 grains of nitrate of potash (*Journ Pharm and Chem 4th series*)

The following brief classification of the more important forms of *Amarantus* met with in India may assist the reader to recognise the species as defined by botanists —

(A.) *Spikes branched, terminal and axillary Stamens 5*

Amarantus Anardana —Erect branched *Leaves* oblong *Spikes* erect cylindrical obtuse. *Calyx* shorter than the bracts sepals oblong elliptic mucro-nulate

A. frumentaceus —Stems and branches erect *Leaves* broad lanceolate *Spikes* adpressed crowded *Calyx* longer than the stamens *Capsule* wrinkled seeds pellucid with a white margin (This may prove to be but a form of a *A. paniculatus*)

A. tristis —Erect very much branched near the ground *Leaves* rhomboid ovate obtuse *Spikes* long erect sparsely branched green

A. spinosus —Erect much branched with round spikes in the axils *Spikes* terminal almost simple with sessile axillary glomeruli

A. paniculatus —Erect branched *Panicle* 1-2 feet long decompositely branched crimson *Leaves* long petioled, broad lanceolate, concave *Sepals* obtuse shorter than the capsule

(B) *Spikes simple and terminal axillary ones very short and distant Stamens 3*

A. gangeticus —Erect branched above the middle *Leaves* rhomboid ovate *Glomerules* axillary or spicate terminal spikes very often ovate obtuse rigid axillary glomerules ovate *Calyx* longer than the slightly rugose capsule and shorter than the bracts

A. lanceolatus —Straight, erect *Leaves* long petioled lanceolate tapering at both extremities *Glomeruli* axillary scarcely spiked *Calyx* 3 membranous with green keel *Anthers* sagittate

A. oleraceus —Erect, sparsely branched *Leaves* broad, rhomboid ovate lanceolate. *Calyx* cuspidate longer than the rugose capsule

A. mangostanus —Terminal spike oblong or sub globose very obtuse sub-flexuose axillary glomeruli rotund *Fruit* shorter than the calyx

A. lividus —Erect smooth *Leaves* long petioled, sub-ovate retuse *Calyx* 3-5 shorter than the compressed capsule.

A. viridis —*Leaves* elliptic-emarginate *Glomeruli* on the ends of axillary twigs. *Sepals* obtuse much shorter than the rugose capsule

A. fasciatus —*Leaves* rhomboid-ovate *Panicles* terminal composed of a few cylindrical branches *Bracts* minute, shorter than the obtuse sepals which are shorter than the rugose capsule

AMARANTUS
Blitum**Forms of Amaranthus in India**

Amarantus polygamus — Diffuse *Leaves* petioled rhomboid-emarginate with a bristle *Glomeruli* rarely spicate *Calyx* twice the length of the capsule.

A. atropurpureus. — Erect branched *Leaves* lanceolate *Glomeruli* axillary and forming terminal spikes *Calyx* 3-5 cuspidate longer than the capsule

(C) *Flowers in axillary glomerules but never forming terminal spikes stamens 3 or 2*

A. polygonoides — A small diffuse plant *Leaves* obovate sub-sessile or petioled *Glomeruli* axillary two parted but never spiked *Capsule* equal or longer than the calyx *Seeds* black shining

A. melancholicus — Much branched 6-12 feet high *Leaves* rhomboid ovate *Calyx* cuspidate longer than the capsules *Glomeruli* almost surrounding the stem

A. tenuifolius — A diffuse annual with shortly petiolate deltoid leaves *Male flowers* diandrous *female* irregular *Capsule* with 6 longitudinal furrows

916

Amarantus Anardana, Hamilt AMARANTACEÆ

Vern.—*Chua* HIND *Chuko* GUJ *Ganhar tawal chaulai sil* (seed) PB

With the exception of *Chua* the vernacular names given above are also associated with **A. mangostanus**. It seems probable that the word *Anardana* may be applied to the grain obtained from most AMARANTACEÆ

References — DC Prod XIII II 256 Stewart's Pb Pl 181

Habitat — Cultivated in the mountain tracts of Bengal and the Upper Provinces

From the information available in works on Indian Economic Botany it is almost impossible to arrive at any conclusion as to the plant which generally bears this name. According to some authors it is only a variety of **A. frumentaceus** (or of **A. paniculatus**) by others it is viewed as a distinct species. The similarity in vernacular names with those given for **A. mangostanus** Linn would lead one to the conclusion that it is nearly related to that plant. Stewart combines the names **A. Anardana** and **A. gangeticus** in a common paragraph describing their properties and it is therefore impossible to separate the vernacular names or to understand how far his description applies to the one or the other. In the *Prodromus DeCandolle* Moquin seems to regard **A. Anardana** as a better known species than **A. frumentaceus** but his description of the latter agrees accurately with the plant cultivated on the Himálaya (the *bathu* of Simla) so that it would seem the Himálayan plant should be known as **A. frumentaceus**.

MEDICINE

917

Medicine — They are used in scrofula and as a local application for scrofulous sores administered in the form of a liquid

§ Astringent in diarrhoea (*Surgeon Barren Bhuj Cutch*)

FOOD

918

Food — The leaves are eaten as a pot herb. The seeds after being parched are used in some places as a food grain but are considered heating

919

A. atropurpureus, Roxb *Fl Ind, Ed C B C*, 662 *DC Prod, XIII*, 2, 264

Said to be cultivated as a pot-herb in Bengal and to be known as *Lál natí, kunka natí* or *bansh pata lál natí*

920

A. Blitum, Linn

Said to be cultivated in India.

A 920

Forms of *Amarantus* in India.**AMARANTUS
frumentaceus.*****Amarantus caudatus*, Linn , DC Prod XIII, pt 2, 255**

921

LOVE LIES BLEEDING, Eng QUEUE DE RENARD, DISCIPLINE DE
RELIGIEUSE Fr

Vern.—*Kedari chua* HIM NAME (according to Atkinson)

Habitat.—Cultivated in gardens throughout India A well known plant with drooping tail like spikes of flowers

Atkinson says it is cultivated in the hills for local consumption The seed is sown in May and June and the crop is ripe in October This is the only mention of this plant being cultivated as a food crop I found one or two plants the other day growing on the border of a field a few miles from Simla On enquiry it was found the people had no name for it and they stated that it was an introduced form of *bathu* which latter they regard as indigenous This species does not seem to have been introduced into India during Roxburgh's time at all events he does not mention it

***A. farinaceus*, Roxb DC Prod, XIII, pt 2 266**

Medicine—The plant is said to possess diuretic and purifying properties

MEDICINE

922

***A. fasciatus*, Roxb Fl Ind Ed C B C 663 Wight Ic, t 717**

923

Vern.—*Tun tuni nati than-nati* BENG *Chilaka tota kura chilaka kura*
TEL *Hilamochaka* SANS

A common green weed (Roxb)

***A. flavus*, Linn DC Prod XIII, 2 258**

924

Said to have been collected by Wallich in Nepal where it was cultivated

***A. frumentaceus*, Buch Wight Ic, t 720**

925

Syn.—It seems probable that this may be reduced to *A. PANICULATUS* Miq ;
A. SPECIOSUS Sims Bot Mez t 2227

Vern.—*Bathu bathu batu* or *bathu* PB *Betu* KUMAON; *Larka baha*
SANTAL *Pungi kirai* TAM

References—Roxb Fl Ind Ed C B C 663 DC Prod XIII 2, 265 ;
DC L Orig Pl Cult Atkinson's Him Districts 697

It seems likely that this is the plant which most generally receives the names *chua* *chua marsa* *ramdana* *anardana* The name *bathu* is in the plains of India generally applied to *Chenopodium album*

Habitat—Cultivated on the Himalaya from Kashmir to Sikkim Roxburgh says it was first discovered by Dr Buchanan on the hills between Mysore and Coimbatore (Compare with the remarks under *A. Anardana* in explanation of the above region over which this species is cultivated) Atkinson says *Chua* is largely grown in the northern *par ganas* up to 9500 feet where it forms the staple food of the poorer classes and is a favourite crop in newly-cleared jungle, as it is not easily injured by bears and deer

Food.—One of the most important sources of food to the hill tribes of India There are two varieties—a golden yellow and a red The former seems to be preferred, since it is more cultivated than the latter but most fields contain as a rule a few red plants here and there amongst the golden-coloured crop Although no doubt the young tops are to a certain extent eaten as a vegetable, most of the hill-men speak of this as only an occasional thing,—the small seed is the product for which it is cultivated

FOOD

926

AMARANTUS gangeticus.**Forms of *Amarantus* in India.****FOOD**

Indeed from the fact that it rarely branches it seems probable that the plant would be injured were the young tops or leaves to be lopped as a vegetable. The unbranched habit is however the result of thick broadcast sowings. When grown singly it seems to branch. It is perhaps one of the most elegant crops cultivated by the hill people. When young the large leaves (seen at a distance) remind the traveller of a turnip-field but when the terminal golden yellow or red crowded spikes of flowers appear in the centre of each terminal rosette of leaves it becomes truly lovely.

Dr Roxburgh records the following facts. In the Botanic Garden 40 square yards of ground sown with this plant in June yielded 21 lbs weight of the clear ripe seed in September. It also grows well during the cold season viz from October till February inclusive. My friend **Mr Campbell** of the Santal Mission informs me that the plant is sparingly cultivated by the Santals and eaten as a pot herb.

Atkinson says. It is sown in May and June in first and second class unirrigated land and yields about twenty loads to the acre. The produce of an acre is worth about Rs 16 and the estimated outlay is about half that sum. The yield and the shortness of the period required for the production of this food supply seem to justify the opinion already indicated that this as also several other species of *Amarantus* might with advantage be resorted to when through want of rain scarcity or even famine is threatened.

927

***Amarantus gangeticus*, Linn**

Vern.—*Lal sag* HIND *Ranga shak lal shak dengua* BENG *Arak gandhari* SANTAL DeCandolle (in *L. Orig. Pl. Cult.*) says that the forms of this plant are called in Telugu *Tota kura* with an adjective to denote the special form. These are the names that Roxburgh gives to the plant he calls *A. oleraceus*, and it is quite probable that the South Indian forms of *lal sag* belong to *A. gangeticus*. Until however this has been clearly established it has been thought advisable to leave the Madras plants in the position assigned them by Roxburgh. *Wright Ic t 715* gives a figure of this species under the name of *A. oleraceus*, Linn. See *A. oleraceus*.

In India cultivated as a vegetable. There are a large series of forms of this species varying as to colour and shape of leaf but referable to two sections—those which may be placed under *A. gangeticus* proper the *lal sag*, and those which would more naturally fall under—

928

Var angustifolius—*A. ANGUSTIFOLIUS* Roxb *Hert*, and *A. LANCEOLATUS* Roxb *Fl Ind Ed C B C 662 Wright Ic n 716 Ic t 713*

Vern.—*Bans patu natiya* BENG

References—Roxb *Fl Ind Ed C B C 662 DC Prod DC L Orig Pl Cult Stewart Pb Pl 181 U C Dutt Hindu Mat Med*

Habitat—A small annual plant common in Bengal and Assam. **Dr Roxburgh** says. The varieties of this useful species cultivated in Bengal alone are endless. They are in more general use among the natives of Bengal than any other species or variety. The varieties are tolerably permanent and differ in colour chiefly which varies from green with the slightest tinge of red to rufous liver-coloured and bright red. One variety has particularly broad leaves with the margins green and the centre dark purple. Most probably this species was originally indigenous to India but it is now extensively cultivated in many parts of the world and even claimed as a native of Egypt and Abyssinia. From the fact that all the species allied to *A. gangeticus* are indigenous to Asia it may be presumed that it is a native of India.

A. 928

Forms of *Amarantus* in India.**AMARANTUS
melancholicus.**

Food.—This and *A. frumentaceus* are perhaps the two most important species of *Amarantus* met with in India. But while the latter is cultivated entirely for its seed *A. gangeticus* is grown as a green vegetable only. It is extensively cultivated by the natives of Bengal sown broadcast under what is commonly known as garden cultivation by professional vegetable-producers. The plants are pulled up when young and sold in the bazars entire the leaves and tender stalks are the parts of the *lāl shāk* chiefly used they are made into curry by all classes of natives. Largely cultivated in Chutia Nagpur. De Candolle (*L. Orig. Pl. Cult.*) says the young stems are sometimes used as a substitute for asparagus on the English table. He also states that several species of annual *Amarantus* are cultivated in Mauritius Bourbon and Seychelles under the name of Bréde de Malabar of which *A. gangeticus* seems to be the chief species. The Japanese cultivate as a vegetable the variety *melancholicus* amongst many others such as *A. polystachyus* Blume.

Medicine—Used in India in the form of an emollient poultice.

FOOD
929

MEDICINE
930

Amarantus hypochondriacus*, Linn DC Prod XIII 2, 256*THE PRINCE'S FEATHER**

An exceedingly handsome annual common in Indian gardens the leaves as well as the spikes being of a rich crimson.

The leaves are said to be astringent and to be used internally and topically in the complaints to which astringents generally are applicable (*U S Dispens 15th Ed 1568*)

931

***A. lanceolatus*, Roxb**

See *A. gangeticus* var *angustifolius*. There seems quite as much ground for this being kept up as a distinct species as for any other species but most authors seem to place it under *gangeticus* and it has therefore been deemed advisable to adhere for the present to that view.

932

***A. lividus*, Linn**

Syn—*Euxolus lividus* Moq in DC Prod XIII 2 273

Vern—*Gobura nati* BENG

A native of America cultivated in India.

O Shaughnessy says it is held in great esteem by the natives.

933

***A. mangostanus*, L DC Prod XIII 2 261**

Vern—*Chaulai ganhar* UPPER INDIA *Ság* BENG *Ság* is a generic name for pot herbs *Choulai* is in South India applied to *Portulaca quadrifolia* (Moodeen Sheriff)

Habitat—Occasionally cultivated in the plains

Food—The leaves are used as a pot herb

Medicine—Mr Baden Powell gives *Amarantus*, sp *Chulal* (p 425) amongst his rare medicinal oils. No other mention can be found of this or any other oil made from *Amarantus* and the fact is therefore of considerable interest. It would be exceedingly interesting to have fuller particulars and also samples of the oil and of the plant from which it is made. The name *chaulai* is applied to this species as also to at least a half of all the known *Amarantuses*, and it may be quite wrong to refer this curious oil to *A. mangostanus*.

934

FOOD
935
MEDICINE
936

***A. melancholicus*, Linn Moquin DC Prod XIII, 2 262**

Syn.—*A. TRICOLOR* Linn.

There are numerous cultivated forms of this species which have received

937

A. 937

AMARANTUS
polygamus.**Forms of Amaranthus in India.**

gardeners names many of which are highly ornamental In *L Orig Pl Cult* DeOandolle says that the forms of this species should all be referred to *A gangeticus* This may be correct but if so the definition of the species will have to be enlarged since in inflorescence and number of stamens they do not agree See classification of species of *Amarantus*

938

Amarantus oleraceus, Linn

Syn — *EUXOLUS OLERACEUS* Moquin DC Prod XIII 2 273

Vern — *Sada natia natiyá ság* BENG *Bhaji* and *támbadámáth*
MAR *Tótakura erra tóta kura, tella tóta kura* and *pedda tóta kura*
TEL *Tand kirai kirai tand* TAM *Dat dant k' bhaji* DUK *Dant*
GUJ AND MAR *Marisha SANS* Compare with the note under vernacular names of *A gangeticus*

This plant if it really exists in India must have been introduced and the various forms attributed to it seem to take the place in Southern India of *A gangeticus* in Bengal The descriptions of these two species as published by Roxburgh hardly differ however and it seems exceedingly probable that the plants which in India have been called *A oleraceus* should be referred to *A gangeticus* Until this opinion can be clearly established however it has been deemed advisable to leave them in the position assigned to them by Roxburgh The following are the forms described by the father of Indian botany —

There are several varieties cultivated as pot herbs over India particularly on the coast of Coromandel The most conspicuous after the common green sort are—

1st — *Erra tóta kura* of the Telingas a very beautiful variety with a clear bright red stem branches petioles nerves and veins and the leaves themselves rather ferruginous (*Lal-dat* DUK)

2nd — *Tella tóta kura* of the Telingas here all the parts that are red in the last variety are of a clear shining white colour (*Saféd dat* DUK)

3rd — *Rosa* or *Pedda tóta kura* of the Telingas is a very large variety which König called *A giganteus* In a rich soil it grows to from 5 to 8 feet high with a stem as thick as a man's wrist The tender succulent tops of the stem and branches are sometimes served up on our tables as a substitute for asparagus (*Gulabi dat* DUK)

The other varieties are more changeable and not so well marked I will not therefore take notice of any more of them

939

A paniculatus, Miq, var cruentus, DC Prod, XIII, 2, 257

Vern — *Rajagaro* GUJ *Táy-e-khurus*, PERS. PESHAWAR; *Bustán afrós* PERS KASHMIR *Rájgará* DUK

Habitat — Most probably a native of China, cultivated in India

MEDICINE

940

Medicine — Used medicinally for purifying the blood and in piles and as a diuretic in strangury (*Baden Powell Pb Prod I, 373*) (See *A frumentaceus*)

941

A. polygamus, Linn

Syn — *EUXOLUS POLYGAMUS* Moquin DC Prod XIII 2 272 *A POLYGAMUS*, Willd *Roxb Fl Ind Ed C B C 661*

Vern — *Chámpá-natiya* or *lál-chámpá-natiya* (or *nuti*) BENG; *Chumli-ság, chowlai ka bhaji* (according to Murray) (see note under *A mangostanus*) HIND; *Doggali-kára*, TEL, *Tanduliya* SANS (according to U O Dutt)

A 941

Prickly Amaranth

AMARANTUS
spinosus.

Cultivated throughout the peninsula of India as a pot herb. It admits of being freely lopped. Roxburgh says both the green and red sorts are extensively cultivated all over the southern parts of Asia. Atkinson says it is a common species grown as a pot herb along the edges of fields in the sub montane tracts.

Amarantus polygonoides, Linn Wight Ic, t 512

942

Syn.—A POLYGONOIDES Willd Roxb Fl Ind Ed CBC 661, AM
BLOGYNA POLYGONOIDES Rafin DC Prod XIII 2 270? Wight
Ic t 719

Vern—*Cheru-natia chelu natipa* BENG *Chira kura* HIND

Though not cultivated the natives use it as a pot herb as it is considered very wholesome especially for convalescents (Roxburgh O Shaughnessy &c)

A. spinosus, Willd DC Prod III 2, 260

943

PRICKLY AMARANTH

Vern—*Kántá naté* or *kánta nutra kanta-marí* BENG *Cholai* ? HIND
Fanum arak SARTAL *Kante-mát* MAR *Mulluk kirai* TAM *Kántá nu-dunt* GUJ *Mundla tóta kura nadla doggalí erra-mulu-góvanta*
TEL *Mullan chira* MAL *Mulla-dc-ntu mulharavesoppu* KAN
Tanduliya SANS *Hinkanoe suba* or *hinnoe suba* BURM

Habitat—Frequent in the plains of India chiefly in Bengal and Malabar

Dye.—Dr McCann in his *Report on the Dye stuffs of Bengal* states that in Cuttack the ashes of this plant are used in dyeing with *Mallotus philippinensis*

DYE

941

Food—The leaves make a good spinach and pot herb though the sharp spines in their axles are troublesome to pick. The poor among the natives use the leaves as pot herbs especially in times of scarcity.

FOOD

945

Medicine—The whole plant is used as an antidote for snake poison and the root as a specific for colic. The root has been found useful in the treatment of gonorrhœa it is said to arrest the discharge.

MEDICINE

Root

946

The Hindu physicians prescribe the root in combination with other drugs in menorrhagia. A poultice of the leaves was officinal in the Bengal Pharmacopœia (*Dymock's Mat Med W Ind*) It is also considered a lactagogue and boiled with pulse is given to cows.

Leaves

947

§ The root has lately been introduced into European practice as a remedy for gonorrhœa and is advertised by some of the London druggists (*Surgeon Major Dymock*) Roots made into poultice are applied to buboes and abscesses for hastening suppuration (*Surgeon Anund Chunder Mukerji Noakhally*) Supposed to be an excellent remedy for gonorrhœa Dose of the decoction of the root one to two oz (*Surgeon W Barren Bhuj Cutch*) *Kántá nutra* is a cooling diuretic. An infusion in hot water I have used in some cases of gonorrhœa. It lessens burning and relieves pain (*Surgeon R L Dutt M D, Pubna*)

Decoction

948

Used frequently for colic pain and for 'scorpion bite' (*Surgeon C F W Meadows Burrisal*) Emollient and used in the form of poultice (*Deputy Surgeon General G Bidie Madras*) "Given to cows as a lactagogue (*Asst Surgeon Shib Chunder Bhuttacharji Chanda Central Provinces*)

In a recent correspondence however with the Government of India in regard to the proposed issue of a revised edition of the *Pharm Ind* the Surgeon General of Madras expressed the opinion that *A spinosus* should be excluded from the future edition of that work.

A 948

| AMBER. | Amber |
|--------------------------------|--|
| 949 | <p>Amarantus tenuifolius, Willd Wight, Ic, t 718 Syn.—MENGEA TENUIFOLIA Moquin DC Prod XIII 2 271 Vern.—<i>Ghénti nati jélchumli</i> BENG Cultivated in Bengal in the neighbourhood of Calcutta—a stemless spreading plant (<i>O Shaughnessy</i>)</p> |
| 950 | <p>A. tristis, Linn Wight Ic, t 514 & t 713 Syn.—<i>A. CAMPESTRIS</i> Willd sp 382 Vern.—<i>Pond gandhari</i> SANTAL Mekanada ganna SANS <i>Churi ki bháji</i> DUK <i>Sirru-kirai kappi kirri</i> (Roxburgh) <i>shiru kirai kurus kirai</i> TAM <i>Sirru kura koyya tóta kura</i> TEL References—DC Prod XIII 2 260 Roxb Fl Ind Ed CBC 661 Habitat—An erect herb branching freely even from the ground There are probably many sub species met with in cultivation in the plains of India (especially of the south and west portions of the peninsula) of which A. campestris is by some authors regarded as a distinct species Medicine—The roots have attributed to them demulcent properties</p> |
| MEDICINE 951 FOOD 952 | <p>Food—Roxburgh says of this plant It is held in great esteem by all ranks of the natives and is much cultivated by them it grows readily all the year round if watered It has always terminal spikes besides it may be cut down several times without destroying the plants for they soon shoot out vigorously again This renders it much more useful to the poorer natives who are possessed of but a very small spot of ground and little time to spare for its culture besides it is in higher esteem than A. oleraceus which yields but one crop § Used also as diuretic in form of a decoction combined with some other medicines (<i>Surgeon Major J T Fitzpatrick M B Coimbatore</i>)</p> |
| 953 | <p>A. viridis, Linn Syn.—<i>EUXOLUS VIRIDIS</i>, Moquin DC Prod XIII 2 273 A BLITUM of most authors but not of Linn Roxburgh says of this plant A native of various parts of India appearing most frequently as a weed in gardens during the rainy and cold seasons The tender tops are eaten by the natives though not so much esteemed as the cultivated sorts' (<i>Fl Ind, III 605</i>)</p> |
| | <p style="text-align: center;">AMARYLLIS</p> |
| 954 | <p>Amaryllis grandiflora, AMARILLYDEÆ the <i>sukhdarsan</i> PB is al- luded to by both Stewart and Baden Powell It is said to yield a medicinal oil If this plant has been correctly identified it can only be cultivated in gardens its modern name is Brunsvigia grandiflora. Stewart says A correspondent of the Agri Horti Society states that the strained juice of two drams reduced to a pulp with water is a good emetic, and that one drop into the ear will generally cure earache From the existence of a vernacular name for this plant however it seems probable that the authors mentioned above have given incorrectly the name Amaryllis grandiflora to some other Amaryllidaceous plant <i>Sukhadarsan</i> is a well known Hind name for a species of Orimum. (<i>Moodeen Sheriff</i>)</p> |
| 955 | <p style="text-align: center;">AMBER.</p> <p>Vern.—<i>Kahrubá</i> HIND DUK PERS <i>Inqitriyún qarnul bahr</i>, ARAB <i>Ambeng</i> BURM A fossilised resin, yielded by trees chiefly pines (P) which grew during</p> |
| | <p>A. 955</p> |

The Ammania.

AMMANNIA.

the cretaceous period of geologists usually found in connection with tertiary lignites. It is hard brittle easily cut of various shades of yellow and semi transparent. It is very useful to the physicist becoming negatively electric by friction. The amber supply is chiefly from the Baltic region Samland being the great centre. Crude amber occurs in commerce in irregular pieces. When ground or heated it emits a pleasant odour. It is completely soluble in alkaline solutions containing camphor. On being boiled for 20 hours in rape or linseed oil it becomes transparent and ductile and may then be moulded into any desired form. It is chiefly used for ornamental purposes such as necklaces bracelets and brooches for mouth pieces of pipes and cigar holders for the preparation of a varnish and for the manufacture of amber-oil and succinic acid. See **Varnish** and also **Gum Copal**.

Irvine in his *Materia Medica of Patna* says that it is used as an aphrodisiac in native medical practice and in his *General and Medical Topography of Ajmere* (published in 1841) he says that the natives of Ajmere do not know real amber but that they use a mixed sort of scent called amber which is of the consistence of plaster and seems an imitation of ambergris. It is chiefly used as an aphrodisiac and costs Rs 5 to Rs 6 a tola.

AMBERGRIS

956

Abr-i-amber Aanbar anber or *araba* of the Indian bazars is produced from ambergris. Ambergris is found in pieces floating in the sea near the coasts of India Africa and Brazil it is of an ash grey colour spotted like marble with black spots but it appears to vary considerably in colour some pieces being white some black and some grey with yellow spots. It is very light and easily takes fire. It is most probably a concretion formed in the stomach or intestines of the spermaceti whale *Physeter macrocephalus*. Several specimens have been found full of the embedded beaks of a species of sepia which is the food of the *Physeter* it is supposed by some to be formed only during disease as the specimens of the whales in the stomach of which ambergris was found were sickly. (*Baden Powell Panjab Products Vol I p 190*) Dr Irvine says that ambergris is brought from Singapore. It is used as an aphrodisiac. It costs Rs 80 a lb (*Mat Med Patna p 10*).

Ambergris has a peculiar aromatic agreeable odour is almost completely volatilizable by heat and is inflammable. It is insoluble in water but is readily dissolved with the aid of heat by alcohol ether and the volatile and fixed oils. It consists chiefly of a peculiar fatty matter analogous to cholesterol and denominated by **Pelletier** and **Oaventou ambrein**. This may be obtained by treating ambergris with heated alcohol filtering the solution and allowing it to stand crystals of ambrein are deposited. It is incapable of forming soaps with alkalies. When pure it has little or no odour. (*U S Disp, 15th Ed 1568*)

Amblogina polygonoides, Rafin, Syn for **Amarantus polygonoides**, AMARANTACEÆ which see

AMMANNIA, Linn, Gen Pl, I, 776

957

A genus of annual glabrous herbs, belonging to the Natural Order LYTHRACEÆ. *Stems* square *leaves* opposite and alternate sometimes whorled entire *stipules* wanting *Flowers* small axillary solitary and subsessile or in small trichotomous cymes *bracteoles* usually 2 *Calyx* membranous, campanulate or tubular-campanulate 3-5 toothed often with minute teeth or folds. *Petals* 3-5 or 0 small, inserted between the calyx teeth *Stamens* 2-8 inserted on the calyx-tube *Ovary* enclosed in the calyx-tube 1-3-celled, the septa often

A. 957

**AMMANNIA
vesicatoria****Blistering Ammania**

absorbed *style* filiform or short *stigma* capitate *ovules* many *placentas* axile *Capsule* membranous dehiscing irregularly or by a circumsciss. *Seeds* many

A genus of sub-aquatic herbs, named after John Ammann, Professor of Botany St. Petersburg

958

Ammannia baccifera, Linn , *Fl Br Ind*, II, 569**BLISTERING AMMANIA****Syn** — *A. VESICATORIA* Roxb**Vern** — *Dād-māri* HIND *Ban marach dādmāri* BENG *Banmarich agin buti guren bhar jambol agiya* BOMB DUK *Kallu rivi nirumel neruppu* TAM *Agnivenda paku* TEL *Kalluvanchi* MAL**Dr Sakharām Arjun** says that in Bombay the *dad mari* is *Cassia Tora***Habitat**. — A small herbaceous plant generally met with on wet places throughout India and extending to Afghanistan and China**Botanic Diagnosis** — Cauline leaves opposite or alternate oblong or narrow elliptic tapering to the base *Flowers* in dense clusters forming knots on the stem or in looser but very short axillary *cymes Capsule* globose**MEDICINE
959****Medicine** — **Dr Roxburgh** says It has a strong muriatic but not disagreeable smell Its leaves are exceedingly acrid they are used universally by the natives to raise blisters in rheumatic pains fevers &c The fresh leaves bruised and applied to the part intended to be blistered perform their office in the course of half an hour or a little more and most effectually **O Shaughnessy** says We made trial of this article in eight instances blisters were not produced in less than 12 hours in any and in three individuals not for 24 hours The bruised leaves had been removed from all after half an hour The pain occasioned was absolutely agonising until the blister rose We should not be justified in recommending these leaves for further trial they cause more pain than cantharides and are far inferior to the plumbago (*lal chitrā*) in celerity and certainty of action The juice of the plant is given internally in spleen but it causes great pain and the result is not certain (*Amster Desc Cat*) In a recent correspondence with the Government of India about the revision of the *Pharmacopœia of India* the Surgeon General of Madras recommended that the *Ammannia baccifera* should be excluded from a future edition of the work§ I find that an ethereal tincture blisters well without more pain than *Liquor Lythæ* (*Surgeon Major Dymock Bombay*) As a blister it is much more painful than cantharides (*Deputy Surgeon General G Bide Madras*) The bruised fresh leaves are applied as a poultice to abscesses and the juice of the root is used in rheumatic affections as a topical application (*Honorary Surgeon P Kinsley Ganjam Madras*)The leaves are used as a vesicant (*Assistant Surgeon Shib Chunder Bhattachary Chanda Central Provinces*)

960

A. senegalensis, Lamk *Fl Br Ind*, II 570**Vern** — *Faugli mehndi dādmāri* Pb**Habitat**. — Grows in wet places in the plains of the Panjāb and of the North West Provinces ascending to 5 000 feet in altitude**Botanic Diagnosis** — *Leaves* opposite, elongate oblong, sessile, subauriculate at the base *Cymes* peduncled compound. *Capsule* $\frac{1}{4}$ in diameter globose**MEDICINE
961****Medicine** — Used as a blistering agent.**A. vesicatoria**, Roxb , *Syn* for *A. baccifera*, Linn which see.**A. 961**

Sal Ammoniac.

AMMONIUM
chlorideAmmoniacum, see *Dorema Ammoniacum*, Don UMBELLIFERÆ

AMMONIUM

Ammonium chloride

962

SAL AMMONIAC *Eng* HYDROCHLORATE D AMMONIAC, *Fr* ,
SALMIAC *Ger*m

Vern.—*Nausadar* HIND *Nishedal nōshāgar* BENG *Navsar nava*
sagar GUJ *Nausagar* MAR *Nava sagara* KAN *Nava charum*
navach chārum TAM *Nava sagaram nava chārum* TEL *Nava*
saram MAL *Milkhunnār armina* ARAB *Nōshdār* PERS *Giatsah*
BHOTE *Navācharam* CINGH *Zatasa dsa wet tha* BURM

This substance is largely manufactured in the Panjāb and used in tinning and forging metals in the formation of freezing mixtures and also in the separation of ammonia

Baden Powell gives an interesting account of the manufacture of sal ammoniac in the Panjab. He states that sal ammoniac has been for ages largely manufactured by the potters (*Kumhars*) of the Kurnāl district chiefly in the village of Gumtallah. The process of the manufacture which is similar to the Egyptian method is as follows. From 15,000 to 20,000 bricks made of the dirty clay to be found in certain ponds are put all round the outside of a brick kiln which is then heated. When these bricks are half burnt there exudes from them a substance of a greyish colour which resembles the bark of a tree. This substance is of two sorts (a) an inferior kind called the *mittikhām* of *naushadar* produced at the rate of 20 to 30 maunds for each kiln and sells at 8 annas a maund (b) the superior kind called *phālī* of which not more than 1 or 2 maunds is obtained from each kiln and sells at ₹2 to ₹2½ a maund. Merchants who deal in sal ammoniac buy both sorts. The *kham mitti* is passed through a sieve and then dissolved in water and allowed to crystallize the solution being repeated four times to clear away all impurities. The pure substance that remains is then boiled for nine hours to allow the liquid to evaporate and the resulting salt has the appearance of raw sugar. The *phālī* is next taken and pounded after which it is mixed with the first preparation. The whole is put in a large pear-shaped vessel made of thin black coloured glass having a neck 2½ feet long and 9 inches round. The vessel is closed at the mouth or, more properly speaking the vessel has no mouth—the composition being inserted by breaking a hole in the body of the vessel near the neck. This hole is eventually closed by placing a piece of glass over it. The vessel is then coated over with seven successive coatings of clay. It is placed in a large earthen pan filled with *nausadar* refuse to keep it firm. The neck of the vessel is further enveloped in a glass cover and plastered with fourteen different coatings of clay to exclude all air. When thus arranged it is placed over a furnace kept burning for three days and three nights the cover being removed once every twelve hours to insert fresh *nausadar* so as to supply the place of what has been sublimed. After three days and three nights the vessel is taken off the furnace and when cool the neck is broken off and the rest of the vessel calcined. A substance called *phālī* is produced by the sublimation of the salt from the body of the vessel into the hollow neck. There are two kinds of *phālī* the superior kind is that produced after the *nausadar* has been on the fire for only two days and two nights in which case the neck is only partially filled with the substance and the yield is about 5 or 6 seers. This is sold at the rate of ₹16 a maund. The inferior kind is produced by the *nausadar* being kept on the fire three days and three nights, the neck of the

AMOMUM

The Cardamom Plant.

vessel is completely filled with *phálí* when it yields 10 or 12 seers, and the salt is sold at ₹13 a maund

That portion of the sublimed *nausadar* which is formed in the mouth and not in the neck of the vessel is distinctively called *phul* and not *phálí* it is used in the preparation of *surma* and is esteemed of great value selling at ₹40 a maund The production of *nausadar* in brick kilns is probably owing to the decomposition of watery vapours by the red hot bricks in presence of the nitrogen of air and of common salt The amount of sal ammoniac manufactured in the Kurnál district is estimated at 2 300 maunds valued at ₹34 500 The merchants buy it on the spot from the manufacturers on an average at ₹8 a maund who export it to Bhawani Dehli Farakabad Mirzapur in the North Western Provinces, and to Firozpur and Amritsar in the Panjáb and who also sell it at ₹15 a maund It is also occasionally extracted from brick kilns in other districts of the Panjab than Kurnál but in small quantities It is found in Europe near burning beds of coal in England and Scotland and also near the volcanoes of Vesuvius Etna &c

It is used as a freezing mixture with nitre and water and in the arts in tinning and soldering metals and in the operation of forging the compound iron used for making gun barrels by native smiths (*Baden Powell Panjab Products I pp 89 90*)

MEDICINE
963

Medicine—In medicine it is prescribed in inflammation of the liver and spleen According to Dr Irvine, it is not used internally in native practice (*Mat Med Patna p 74*)

§ Dissolved in oil or yolk of eggs it is used as a local application in cases of leucoderma (*Assistant Surgeon Gholam Nabi*) Used largely in congested liver in bronchitis and in glandular enlargement as an external application (*Assistant Surgeon Nehal Sing Saharunpore*)

Useful in guinea worm both internally and externally (*Surgeon Major G Y Hunter Karachi*) Largely imported into Bombay from Europe (*Surgeon Major Dymock Bombay*) An excellent remedy in affections of the bronchial tubes Relieves hemicrania if given in 10 or 20 grain doses (*Surgeon Major W Barren Bhuj Cutch Bombay*) Useful in neuralgic headache in doses of 20 grains I have used it largely in chronic diseases of the liver with benefit As obtained in the bazar it is very impure and should be recrystallized (*Assistant Surgeon Shib Chunder Bhattachary Chanda Central Provinces*) It is useful when ammonia is not procurable This and quicklime can be procured in any bazar and in cases of sudden fainting or hysterical fits mix the two in a phial with gentle heat ammonia will be given off (*Surgeon K D Ghose Khulna*) Invaluable in neuralgia, 20-grain doses every 3 hours relief after 3 doses or not at all also in laryngeal cough or spray In catarrh of Bhyondic and of the urinary tract in whooping cough migraine (*By a Surgeon who has not signed his contributions*) Mixed with *kalakootkee* (*Helleborus niger*) and softened with water applied to the temple and forehead in the form of a paste in cases of hemicrania (*Assistant Surgeon Anund Chunder Mukerji Noakhally*) "In 10-grain doses 3 or 4 times a day I have found the medicine to be of the greatest use as an alternative in different affections of the liver (*Assistant Surgeon Doyal Chunder Shome Calcutta*)

964

AMOMUM, Linn, Gen Pl, III, 644

A genus of herbaceous plants belonging to the Natural Order SCITAMINEÆ and the Tribe ZINGIBEREÆ comprising some 50 species, chiefly inhabiting the tropical regions of Asia and Africa, a few extending to Australia and the Pacific Islands

Root-stock horizontal thick or elongated *rooting* *Leafy branches*

A. 964

The Aromatic Cardamom Plant.

AMOMUM
dealbatum.

ascending from the ground destitute of flowers. *Leaves* lanceolate spreading distichously sessile sheathing. *Scape* short-oblong crowded spike with the flowers expanding spirally (strobiliferous) or elongated leafless, with a few scales ascending in spring from the rhizome very rarely terminating the leafy branches (compare with inflorescence in *Alpinia*). *Bracts* imbricate solitary or 2-3 flowered. *Calyx* tubular dilated upwards (spathaceous) obliquely 3-fid the posterior sepal very much larger than the others. *Corolla tube* most frequently exceeding the calyx limb 3-lobed equal and prominent or the posterior very much larger erect and hooded the lateral ones long narrow spreading. *Stamens* theoretically 6 in two series the outer petaloid of which the two posterior are reduced to two small awn-shaped teeth inserted upon the mouth of the corolla tube and the anterior one developed into a large labellum or spreading lip entire and undulated on the margin or more or less trilobed convolute at the sheathing base. *Filament* of the fertile stamen short ascending from the mouth of the corolla posterior and within the erect hooded petal. *Connective* more or less dilated concave upon which the two large diverging anthers are inserted prolonged beyond into a small appendage which may be entire or variously cut or produced into a crest entire or trilobed and often highly coloured. *Ovary* inferior 3-locular many-ovuled style thin prolonged behind the anther-cells stigma subglobose fitting into the space formed through the anthers diverging upward. *Fruit* globose or oblong embraced by the fleshy receptacle pericarp fleshy rough or echinate indehiscent or bursting irregularly or into 3 valves. *Seeds* many globose or obovoid truncate.

A genus closely allied to *Alpinia*, differing chiefly in the habit and inflorescence and in the diverging anther cells and the prolonged or crested connective.

Amomum aromaticum, Roxb SCITAMINEÆ.

965

THE AROMATIC CARDAMOM PLANT

Vern.—*Morang ilachi* BENG and HIND *Veldode* MAR

Habitat.—A native of the villages on the eastern frontier of Bengal (Roxb)

Medicine.—The *Pharmacopœia of India* refers the Greater Cardamom to this plant following apparently an error which exists in all the earlier works on Indian Economic Science. Mr Hanbury made the same mistake. See *A. subulatum*.

MEDICINE.
966

The fruit ripens in September the capsules are then carefully gathered by the natives and sold to the druggists who dispose of them for medicinal and other purposes where such spices are wanted under the name of *morang ilachi* or *cardamom* though the seed vessels of this species differs in form from all hitherto-described sorts of this drug how ever the seeds are similar in their shape and spicy flavour (Roxburgh)

Apparently this fruit is not now used or there was some mistake on the part of Dr Roxburgh as to this being the Greater Cardamom of Bengal. He does not call it by the name of Greater Cardamom but the plant which is sold and used at the present day as the Greater Cardamom of Bengal and presumably the *morang ilachi* of Roxburgh, has been identified as the fruit of *A. subulatum*.

§ Astringent and tonic used as a tooth powder and said to be a good dentifrice (Surgeon John McConaghey M.D. Shahjehanpore)

A. dealbatum, Roxb

967

Habitat.—A native of Eastern Bengal and the adjoining frontier; a stately species flowering in March and April and ripening its insipid seed in September and October

Food.—According to Mr Baden Powell (*Pb Prod.*, 380) this is the species which yields the Cardamom, the *Ilachi bar* or *kaldn* of the

FOOD
968

A. 968

**AMOMUM
subulatum****The Greater Cardamom.**

Panjáb bazars He says of it 'Said to be more powerful than the smaller kind but to resemble it in other respects An agreeable aromatic stimulant It seems probable that this is a pure case of mistaken identity and that the above quotation should be referred to **A. subulatum**.

969

A. masticatorium, Thw En Cy Pl, 317

Habitat—Common in the forests of the central provinces of Ceylon up to an elevation of 4 000 feet

FOOD
970

Food—The Singhalese chew the rhizomes of this plant with their betel

971

A. maximum, Roxb

Habitat.—A native of Java This was supposed by Dr Pareira to be the Greater Cardamom of Bengal Dr Roxburgh says it was introduced into Bengal from the Malay Islands by the late Colonel Kyd

FOOD
972

Food—The flowering time is the hot season and the seeds ripen three or four months afterwards they possess a warm pungent taste somewhat like that of Cardamoms but by no means so grateful (Roxburgh)

973

A. Melegueta, Roscoe

Habitat—Cultivated to a small extent in Indian gardens A native of and widely distributed in West Tropical Africa extending from Sierra Léon to the Congo

FOOD
974

Food—Grains of Paradise or Melegueta Pepper are the produce of this species They are carminative aromatic and are used to flavour cordials and to give false strength to beer and other liquors

MEDICINE
975

Medicine—They are also used in cattle medicines (Smith *Pharmacographia Bent & Trim*) About 1 000 cwt are annually exported to Great Britain from the Gold Coast which is chiefly consumed in the preparation of cattle medicine

§ Used commonly as carminative (Nehal Sing Saharunpore)

976

Amomum subulatum, Roxb**THE GREATER CARDAMOM**

Vern—Bari-iláchi HIND Bara elachi BENG Elachi elcho moto-ilachi GUJ Bari ilayechi DUK Mott veldode MAR Periya-yelak kay kattu yelak háy TAM Pedda yéla káyalu adav yela kaya TEL Doddá-yalakkí KAN Pérélam periya elattari MAL Brihat upakun chika ela SANS Qakilhahe kibar hel sakar ARAB Qakilhahe kalan qáqilahe-sakar PERS Ben, pala BURM

The meaning of almost all the vernacular synonyms is according to Mooden Sheriff the *Larger Cardamom* The Greater Cardamom is most readily obtained in Calcutta Hyderabad Bombay and other places under the Arabic name *Qakilhahe kibar* in Madras it is to be had under the names *Jangli ilachi* DUK *Kattu elakkey* TAM and *Adavi-ela kaya*, TEL—all signifying the wild Cardamom

Habitat—A native of Nepal

The Greater Cardamom has a fruit about the size of a nutmeg irregularly obcordate flattened antero-posteriorly having 15 to 20 irregular dentate-undulate wings which extend from the apex downwards for two-thirds of the length of the Cardamom Dr King, in the *Linnean Journal*, Vol XVII p 3 (reproduced in *Kew Report 1877 p 27*) clearly showed that the larger Cardamoms were the produce of this species and not of *A. aromaticum*, Roxb to which plant Dr Roxburgh attributed them, but he presumes that it may be possible the latter plant was used in Roxburgh's time, though out of use now

A. 976

| Amur Timber | AMOORA. |
|--|---|
| <p>Medicine—The seeds yield a medicinal oil. It is an agreeable, aromatic stimulant, pale yellow in colour, having the odour and flavour of the seeds. The seeds are aromatic and camphoraceous. Medicinal properties will be found under the true cardamom, i.e. <i>Elettaria Cardamomum</i>, for which the greater cardamom is used as a cheap substitute.</p> <p>Food—The greater cardamoms are much used in the preparation of sweetmeats on account of their cheapness.</p> <p>The Opinions of medical officers received appear chiefly to refer to the true cardamom, although communicated under this species.</p> <p>§ Used as a carminative and stomachic. (<i>Assistant Surgeon Fawant Rai Mooltan</i>). It acts as a stomachic and is said to allay irritability of the stomach produced either by cholera or some other affections. The decoction of cardamom is used as a gargle in affection of the teeth and gums. In combination with the seeds of melons it is used as a diuretic in cases of gravel of the kidneys. (<i>Assistant Surgeon Gholam Nabi</i>). Invaluable in certain disorders of the digestive system, marked by scanty and viscid secretion from the intestines, promotes elimination of bile and is useful in congestion of the liver. (<i>Surgeon J. Mastland M.B. Madras</i>). Very useful in liver affections, especially where abscess threatens. dose x grain. (<i>Surgeon Major C. R. G. Parker Pallaveram Madras</i>). I have found it most useful in neuralgia, in large doses 30 grains in conjunction with quinine. It is also a useful carminative in dyspepsia and diarrhoea. (<i>Surgeon Major Henry David Cook Calicut Malabar</i>). Used in gonorrhoea as an aphrodisiac. (<i>Surgeon Major J. J. L. Ratton M.D. Salem</i>).</p> | <p>MEDICINE Oil 977 Seeds 978 F60D 979</p> |
| <p>Amomum xanthioides, Wall</p> <p>Vern—§ The seeds <i>Ilayechi-dand</i> HIND and <i>DUK Elam</i> TAM <i>Ela kulu</i> TEL</p> <p>Habitat—§ The seeds (not entire capsules) are imported from China and Singapore and met with in every large bazar of South India.</p> <p>Description—They are angular and very irregular seeds, generally inclining to be triangular and sometimes compressed or flat, smaller in size than the common cardamom seeds, colour pale brown, odour strongly aromatic and agreeable, and taste aromatic and slightly pungent. Although the smell and taste of these seeds are stronger than those of the common or Malabar cardamom (<i>Elettaria Cardamomum</i>), yet they are more agreeable, and there is the same difference between the tinctures prepared from these drugs.</p> <p>Medicine—The seeds are stimulant and carminative and are useful in all the affections in which the common cardamoms are indicated. They are also of great service in relieving tormina and tenesmus, and even frequency of motions in some cases of dysentery, and for this purpose they must always be used in powder with butter. They are administered in simple powder and compound tincture, the latter being prepared in the same way as the Tincture Cardamom Co. of the Pharmacopœia of India. Dose of the powder, from 20 to 40 grains, and of the tincture, from 3i to 3ii. (<i>Moodeen Sheriff Khan Bahadur Madras</i>).</p> | <p>980</p> <p>MEDICINE 981</p> |
| <p>AMOORA, Roxb. Gen. Pl., I, 334</p> <p>A genus of trees belonging to the Natural Order MELIACEÆ, comprising some 15 species, inhabitants of the tropical and extra tropical regions of Asia and Australia, 12 occurring in India and 1 being endemic to Australia.</p> <p>Leaves usually unequally pinnate, leaflets oblique, quite entire. Inflorescence subdichous, paniculate, female spicate or racemose. Calyx 3-5 partite or fid. Petals 3-5, thick, concave, imbricated, rarely slightly combined at the base. Staminal tube subglobose or campanulate, inconspicuously 6-10</p> | <p>982</p> <p>A. 982</p> |

AMOORA
Rohituka.**Amur Timber**

crenate *anthers* 6 to 10 included *Disk* obsolete *Ovary* sessile short 3 5-celled; cells 1 2 ovuled *Stigma* sessile or style elongated. *Capsule* sub-globose coriaceous 3 4-celled and seeded loculicidally 3 5 valved *Seeds* with a fleshy aril *hilum* ventral

The generic name is derived from the Bengali vernacular name *Amur*

983

Amoora cucullata, Roxb Fl Br Ind I 560

Syn.—ANDERSONIA CUCULLATA Roxb Fl Ind Ed CBC 310

Vern—*Amur latmi natmi* BENG *Thitnee* BURM

Habitat—A moderate sized evergreen tree met with on the coasts of Bengal and Burma in Nepal and in the Andaman Islands

Botanic Diagnosis—A large tree of slow growth with cinereous bark sub glabrous *leaflets* 3 13 opposite or sub opposite obliquely oblong obtuse at both ends terminal one often hooded at the apex *Flowers* panicled not spicate males drooping about as long as the leaves with numerous diverging branches sparingly lepidote female racemes few flowered *Petals* 3 *Anthers* 6-8 *Style* short *ovary* 3 celled cells 2 ovuled. *Fruit* sub-globose 3 lobed 3 celled and 3 valved

Structure of the Wood—Red hard close-grained but apt to split Weight 44 lbs per cubic foot

Used for posts and other purposes in Lower Bengal and for firewood in the Sundarbans

TIMBER.

984

DOMESTIC

985

986

A decandra, Hiern Fl Br Ind I, 562

Vern—*Tangarak* LEPCHA

Habitat—A large spreading tree found in the Eastern Himalaya Nepal Sikkim from 2 000 to 4 000 feet

Botanic Diagnosis—*Leaflets* 7 13 opposite oblong acuminate base somewhat cuneate or nearly rounded sub glabrescent and sub-membranous Male panicles equalling the leaves *Flowers* fragrant on slender pedicels *Sepals* very short *Petals* 5 *Anthers* 10 *Ovary* 3 5 celled cells 1-ovuled *Fruit* globose 5 furrowed umbilicate 5-celled and seeded

Structure of the Wood—Pinkish white hard

TIMBER

987

988

A. Rohituka, W & A Fl Br Ind, I, 559

Syn.—ANDERSONIA ROHITUKA Roxb Fl Ind Ed CBC 311

Vern—*Harin hara harin khana* HIND *Tikta-ray yitray* BENG ; *Sikru* KOL *Sohaga* OUDH *Bandripthal* NEP *Tangarak* LEPCHA *Lota amari amora amari* ASS *Okhioungsa okhyang* MAGH *Shem maram* (the red-wood plant) TAM *Chaw manu rohitakah* TEL *Shem maram* MAL *Rohituka*, SANS *Hingal gass* SINGH *Thitni chayam ka-you* BURM

Habitat—An evergreen tree with large crown of branches met with in Oudh Assam Sylhet and Cachar Northern and Eastern Bengal Western Ghats and Burma the Andaman Islands and Malacca

Botanic Diagnosis—*Leaves* 1 3 feet long *leaflets* 9-15 in size 3 to 9 by 1½ to 4 inches young parts tawny closely pubescent early glabrescent. *Flowers* white bracteate sub sessile, (male spikes panicled female simple *Calyx* 5 partite petals 3 *Anthers* 6. *Ovary* 3-celled with 2 superposed ovules in each cell

Oil—In Bengal an oil is expressed from the seeds The natives, where the tree grows plentifully extract this oil, which they use for various economic purposes (*Roxburgh*)

Medicine.—The bark is used as an astringent

§ "The ripe seeds yield an oil which is burnt by the poorer classes

OIL.

989

MEDICINE.

990

A 990

The Amorphophallus.

AMORPHOPHALLUS
campanulatus.

and is used as a stimulating liniment in rheumatism. The seeds are fried and bruised then boiled with water when the oil floats on the top (Surgeon D. Basu Faridpur Bengal)

Structure of the Wood—Reddish close and even grained hard. The concentric bands in this species are remarkable since they are absent from the two other species. Average weight 40.5 lbs per cubic foot.

The timber is of good quality but is little used. In Chittagong canoes are sometimes made of it.

TIMBER
991**Amoora spectabilis, Miq Fl Br Ind, I, 561**

992

Vern—Amari ASS

Habitat—An evergreen tree found in the eastern moist zones of Assam and Burma.

Botanic Diagnosis—*Leaflets* 11-13 opposite or sub opposite oblong acutely acuminate base obtuse glabrescent shining glaucescent beneath petiolate. *Male panicles* pedunculate with alternate unequal branches. *Calyx* stellately puberulent obtusely 3 lobed short. *Petals* 3 imbricate sub stellate velutinous along the back. *Staminal tube* urceolate glabrous shortly and obtusely 8 dentate. *Anthers* 8. *Fruit* obovoid pyriform $1\frac{1}{4}$ to $1\frac{1}{2}$ by 1 to $1\frac{1}{4}$ inch. Some doubt exists in botanical works regarding this species.

Structure of the Wood—Red hard close-grained durable and takes a good polish. Weight 48 lbs per cubic foot.

Used for boat building and furniture in Assam.

TIMBER
993**AMORPHOPHALLUS, Blume Gen Pl III 970**

994

Monogr Phanerog DC II, 308

A genus of tuberous rooted herbs belonging to the Natural Order AROIDEÆ Tribe PYTHNONIÆ. There are in all some 5 species inhabitants of tropical Asia and Africa of which 7 are met with in India and Ceylon.

Leaves generally solitary ascending from the flattened corm after the spathe has faded. *Petiole* erect variously spotted blade large primarily 3-veined and bulbiferous segments pinnatifid or bipinnatifid or dichotomous ultimate divisions oblong acute. *Spathe* broad ovate base infundibuliform or campanulate connate spreading above and exposing the spadix. *Spadix* erect fleshy as long as the spathe appendix dilated fungus like. *Male flowers* crowded forming a fusiform section placed immediately above the female cylindrical section. *Neuter flowers* none. *Perianth* none. *Female flowers* ovary globose 1-4 celled style short or elongated stigma entire 2-4 lobed. *Ovules* solitary in the cells anatropous or half anatropous decurved funiculus short or sub-elongated placenta basilar micropyle inferior.

The word Amorphophallus is derived from ἀμορφος and φάλλος in allusion to the shapeless form of the plant or rather to the barren appendix of the spadix which is not only devoid of flowers but assumes an irregularly crumpled form.

Amorphophallus bulbifer, Blume AROIDEÆ

995

Syn—ARUM BULBIFERUM, Roxb Fl Ind Ed C.B.C., 310

Vern—Umla bela BENC

Habitat—A native of Bengal plentiful in the neighbourhood of Calcutta, where it blossoms in May, the leaves appearing in the rainy season.

A. campanulatus, Blume Wight Ic, t 785

996

Syn—ARUM CAMPANULATUM Roxb

Vern—The tuber Zamin hand PERS and HIND Ol BENG Kanda arsa ghna SANS Yanglis suran BOMB CUTCH Suran MAR Karu-

a

A 996

AMORPHOPHALLUS
campanulatus.**The Amorphophallus.**

nak kishangu or *karuna kalang*, *nalle karuna karang* (a variety) TAM
Kanda godda kanda potr kanda durada kanda godda manchuk anda
 or *ghensi kanda* (variety) TEL *Karuna kishanna* or *karuna karang*
 MAL *Kandá* DUK HIND *Wa* BURM

It seems probable that one of the forms of this plant affords the *madan mast* of Bombay druggists described by Dr Dymock (*Mat Med W Ind* 664) under the name of *Amorphophallus sylvaticus*. A note which Dr Dymock has kindly supplied would seem to justify this inference while on the other hand it is possible that the tubers of *Arum sylvaticum*, Roxb (now known as *Synantherias silvatica* Schott —see Engler *Mono Phaner DC* 320) affords the drug referred to by Dr Dymock the more so since that species is a native of Bombay. The name *madan mast* appears however to be also given to *Amorphophallus campanulatus* Blume and in Madras to *Artabotrys odoratissima*, R Br (Moodeen Sheriff).

Habitat —A native of India and Ceylon cultivated throughout the peninsula in rich moist soils.

Medicine —The corm (or tuber) and the seeds are used as irritants and relieve the pain of rheumatic swellings when applied externally. It is considered a hot carminative in the form of a pickle.

Mr Baden Powell says The roots contain a large quantity of farinaceous matter mixed with acrid poisonous juice which may be extracted by washing or heat. When fresh it acts as an acrid stimulant and expectorant and is used in acute rheumatism. U O Dutt says The tubers contain an acrid juice which should be got rid of by thorough boiling and washing otherwise the vegetable is apt to cause troublesome irritation in the mouth and fauces. Medicinally *surana* is considered serviceable in hæmorrhoids in fact one of its Sanskrit synonyms is *arsoghna* or the curer of piles. It is administered in this disease in a variety of forms. The tuber is covered with a layer of earth and roasted in a fire the roasted vegetable is given with the addition of oil and salt.

§ The dried corm sliced is sold in Bombay under the name of *madan mast* as a restorative tonic and carminative. (Surgeon Major W Dymock Bombay) The tubers first boiled with tamarind leaves and paddy husk and then made into a curry with the usual condiments is efficacious in bleeding piles. It produces intense itching of the tongue when tasted, and it is to remove this irritating quality that tamarind is largely used when cooking it. (Honorary Surgeon P Kinsley Ganjam Madras) The cultivated or pinkish white variety is used as food. The tuber is cut into small pieces boiled in water to get rid of the irritation and then used as a *bhurta* or in curry or is fried with cocoanut pulp. Medicinally I have seen its benefit in bleeding piles. It should be used in the form of *bhurta*. (Surgeon Major R L Dutt MD Pubna Bengal) Recommended by native physicians in piles. I tried it in various forms without success. (Assistant Surgeon Shib Chunder Bhutachary Chanda Central Provinces) It is used externally in the form of poultice in the bites of insects scorpions &c. Internally in the form of a pickle it is used as a laxative in hæmorrhoids. (Brigade Surgeon F H Thornton B A M B Monghyr) Used as a stimulating poultice. (Surgeon W Warren Bhuj Cutch Bombay) Used in boils and ophthalmia. (Surgeon H W Hill Mánbhum Bengal)

Speaking of the *jangli suran*, Dr Dymock says the tuber is peeled and cut into segments and in that condition is sold in the Bombay native druggists shops as *madan mast*. The segments are usually threaded upon a string, and are about as large as those of an orange of a reddish brown colour, shrunken and wrinkled brittle and hard in dry weather the surface is mammillated. When soaked in water they swell up and

MEDICINE
Corms
997

The Ampelidæ

AMPELIDÆ.

become very soft and friable developing a sickly smell' *Madan mast* has a mucilaginous taste and is faintly bitter and acrid it is supposed to have restorative powers and is in much request The above extract may probably be describing the properties of a plant quite distinct from *Amorphophallus campanulatus* (see remarks under vernacular names and also under *Synantherias silvatica* Schott)

Food—The corms or solid bulbs are considered nutritious and wholesome when cooked and are accordingly in common use as an article of food They are boiled like potatoes and eaten with mustard they are cooked in curries they are cut into slices boiled with tamarind leaves and made into pickles and they are also cooked in syrup and made into preserves

The larger corms have small lateral tuberosities these are separated and form cuttings for propagation They are planted immediately after the first rains (say May and June) in loose rich soil repeatedly ploughed In twelve months they are fit to be taken up for use If cultivated under favourable circumstances each corm will weigh from 4 to 8 lbs and they may be preserved for some time if kept dry The average outturn is about 200 to 400 maunds per acre and the price is about Rs 2½ a maund

§ When cultivated the tuber becomes large and loses much of its irritant properties and when boiled or otherwise cooked makes a substantial starchy vegetable It is sold largely in the Calcutta bazars (*Surgeon K D Ghose, Khulna*) Used as food possessing most of the properties of *Alocasia indica* If not properly cultivated in loose soil it becomes irritant in its action' (*Surgeon D Basu Faridpur, Bengal*) When cooked the tubers are wholesome and nutritious (*Deputy Surgeon General G Bidie Madras*)

FOOD
Corms
998

Amorphophallus dubuis, Blume

999

A native of Ceylon and the Malabar Coast of India

A. giganteus, Blume

1000

Syn for *Conophallus giganteus* Schott

A native of Malabar Ceylon Java &c

A. lyratus (Arum lyratum, Roxb)

1001

Imperfectly known said to be a native of the Circars Madras

A. margaritifera, Kunth and **Arum margaritifera Roxb** (*Dymock Mat Med Western India 664*) Syn for *Plesmonium margaritifera* Schott which see

A. tuberculiger, Schott

1002

A native of the Khásia Hills and of Sikkim

A. zeylanicus, Blume

1003

A native of Ceylon and Java

AMPELIDÆ

1004

Small trees or shrubs usually climbing by means of tendrils more rarely radican (sometimes herbaceous in *Leea*) juice copious watery *Stems* angled, compressed or cylindric with numerous very large proper vessels *Leaves* alternate usually petioled simple or digitately or pedately 3 or foliolate, rarely pinnate or decompound. *Flowers* umbellately paniculately- or spicately-cymose *Peduncles* often transformed into simple or compound tendrils or adhering to rocks or trees by viscid pads

**ANABASIS
multiflora****The Vine Family**

terminating the ultimate segments or expanded into a broad floriferous membrane (*Pterisanthes*) *Flowers* regular hermaphrodite rarely unisexual *Calyx* small entire or 4 5 toothed or lobed *Petals* 4 5 distinct or cohering valvate caducous *Stamens* 4 5 opposite the petals inserted at the base of the disk or between its lobes, filaments short subulate anthers free or connate 2-celled introrse *Disk* free or connate with the petals stamens or ovary annular or variously expanded *Ovary* 2 6 celled *style* short slender conical or o stigma minute or large and flat sublobed ovules 1 2 in each cell ascending anatropal raphe ventral *Berry* 1 6 celled cells 1 2 seeded *Seed* erect often rugulose albumen cartilaginous *embryo* short basal *cotyledons* ovate *Distrib*—Species about 250 inhabiting the tropical and temperate regions of the whole world

Scandent shrubs usually bearing tendrils *Flowers* racemose or cymose *Ovary* 2-celled cells 2 ovuled

Flowers sessile on the dilated membranous peduncle 1 *Vitis*

Erect shrubs destitute of tendrils petals and stamens connate with the disk *Ovary* 3-6-celled cells 1 ovuled 2 *Pterisanthes*

3 *Leea*

(*Flora of British India* I 645)

The above extract has been published here with the object of suggesting the names of the genera of this family the economic information will be found under these in their respective alphabetical positions

Distribution of the Ampelideæ—There are in all some 250 species belonging to this order chiefly met with in the tropics extending to the temperate regions They are rare in America and exceedingly rare in the Pacific Islands none are indigenous to Europe The vine-grape appears to have been originally a native of Georgia and Mingrelia but it is now cultivated in all countries with a mean summer temperature not below 66° Fh Where the temperature falls below 66° Fh the grapes never become sweet where it is much above that temperature they do not mature although the plant may flourish as in Indian gardens

In India there are in all 94 species grouped in three genera Of these 52 or 55 3 per cent are confined to the plains 34 or 35 1 per cent are found up to an altitude of 5 000 feet and 8 or 8 5 per cent up to an altitude of 10 000 feet Geographically 50 or 53 1 per cent are confined to East India 10 or 10 6 per cent to West India 8 or 8 5 per cent to South India and 3 or 3 2 per cent to North India all three being in the Upper Gangetic Sub Division Of the remaining 23 species 8 or 8 5 per cent are found in two or more regions not including North India and 15 or 15 9 are found in North India as well as in one or more of the other divisions All these 15 species are found in the Upper Gangetic Sub Division 5 of them are also found in the West Panjab and 2 in the dry tracts of the Panjab and Sind Sub Division of North India.

1005 **Amygdalus communis**, Linn, see *Prunus Amygdalus*, Baill ROSACEÆ

Amyris commiphora, Roxb, see *Balsamodendron Roxburghii*, Arn
BURSERACEÆ

ANABASIS, Linn *Gen Pl*, III 72

Anabasis multiflora, Moq CHENOPODIACEÆ, DC *Prod*, XIII, 2,
212

Vern.—*Ghalme lāna metra lāne gora lāne dāna shor lāna but choti* Pb

Habit.—Met with in the Panjab, a short distance east of the Sutlej

A 1005

Classified List of the Anacardiaceæ

ANACARDIACEÆ.

Medicine.—Mr Baden Powell mentions this plant amongst his drugs but says nothing of its medicinal property
Fodder—Camels are fond of the plant

MEDICINE
 1006
FODDER
 1007
 1008

ANACARDIACEÆ

' Trees or shrubs juice often milky and acrid *Leaves* alternate, opposite in *Bouea*, exstipulate simple or compound *Inflorescence* various flowers small regular unisexual polygamous or bisexual *Calyx* 3 5 partite sometimes accrescent spathaceous in *Gluta* *Petals* 3 5, alternate with the sepals free rarely O imbricate or valvate in bud sometimes accrescent *Disk* flat cup shaped or annular entire or lobed rarely obsolete *Stamens* as many as the petals rarely more inserted under rarely on the disk filaments usually subulate anthers 2-celled basi or dorsi fixed *Ovary* superior half inferior in *Holigarna*, 1 or 2 6-celled rudimentary or 2 3 fid in the ♂ of 5 6 free carpels in *Buchanania*, styles 1 4 or stigma sub sessile ovules solitary in the cells pendulous from the top or wall or from an ascending basal funicle *Fruit* usually a 1 5 celled 1 5 seeded drupe stone sometimes dehiscent *Seed* exalbuminous embryo straight or curved cotyledons plano convex radicle short
Distrib—Chiefly tropical genera about 45 species about 450

"*Sorindeia madagascariensis*, DC (Wall Cat 8491) is cultivated in gardens in India

"**Tribe I Anacardiæ** *Ovary* 1 celled or if 2-celled, with one cell early suppressed

(A) OVULES PENDULOUS FROM A BASAL PANICLE

* *Sepals and petals not accrescent*

- | | | | | |
|---|------------|--|-------------------------|--------------------|
| Calyx 4 5 partite | Petals 4 6 | Stamens 4 10 | 1 | <i>Rhus</i> |
| Leaves alternate usually compound | | | | |
| Calyx 5 partite | Petals O | Stamens 3 4 | 2 | <i>Pistacia.</i> |
| Leaves alternate compound | | | | |
| Calyx 4 5 partite | Petals 4 5 | Stamens 1 5 | 3 | <i>Mangifera</i> |
| Style filiform. Leaves alternate simple | | | | |
| Calyx 5 partite | Petals 5 | Stamens 8 10 all or a few only perfect | *3 | <i>Anacardium.</i> |
| Torus stipulate Style filiform Leaves alternate simple | | | | |
| Calyx 3 5 partite | valvate | Petals 3 5 | Stamens 3 5 all perfect | 4 |
| Style short Leaves opposite, simple | | | | <i>Bouea.</i> |
| Calyx spathaceous | Petals 4-6 | Stamens 4 6 | 5 | <i>Gluta.</i> |
| Torus stipulate Style filiform Leaves alternate simple | | | | |
| Calyx 3 5 lobed | Petals 3 5 | Stamens 10 | 6 | <i>Buchanania</i> |
| Carpels 5 6 one only perfect Styles short Leaves alternate simple | | | | |

** *Sepals or petals accrescent Leaves simple*

- | | | | |
|-------------------|-----------------------|---|--------------------|
| Calyx spathaceous | Stamens 5 or numerous | 7 | <i>Melanorrhœa</i> |
| Calyx 5 partite | Stamens 5 | 8 | <i>Swintonia.</i> |

(B) OVULES PENDULOUS FROM THE TOP OF THE CELL OR FROM THE WALLS OF THE OVARY ABOVE THE MIDDLE

* *Leaves 3-foliate or pinnate*

- | | | | | |
|----------------------|----------------|------------|---|----------------------|
| Calyx not accrescent | Petals valvate | Stamens 10 | 9 | <i>Solenocarpus.</i> |
| Style 1 | | | | |

A 1008

ANACARDIACEÆ**Distribution of the Anacardiaceæ**

| | | | | | |
|--|------------------|------------------|------------|----|----------------------|
| Calyx not accrescent mens 10 | Petals imbricate | Style 1 | Stamens 10 | 10 | Tapiria |
| Calyx not accrescent mens 5 with 5 staminodes | Petals imbricate | Style very short | Stamens 11 | 11 | Pentaspadon |
| Calyx not accrescent mens 8 10 | Petals imbricate | Styles 3 4 | Stamens 12 | 12 | Odina |
| Calyx accrescent 3 fid | Petals 4 | Stamens 4 | Style 13 | 13 | Parishia |
| ** Leaves simple | | | | | |
| Petals imbricate on a much enlarged peduncle | Stamens 5 | Styles 3 | Drupe 14 | 14 | Semecarpus |
| Petals imbricate superior | Stamens 5 | Style 1 | Drupe 15 | 15 | Drimycarpus |
| Petals valvate inferior | Stamens 5 | Styles 3 | Drupe 16 | 16 | Holigarna |
| Petals valvate superior | Stamens 5 | Style 1 | Drupe 17 | 17 | Melanochyla |
| Petals imbricate Drupe superior | Stamens 4 | Style 1 short | 18 | 18 | Nothopegia |
| Petals imbricate Drupe superior | Stamens 6-10 | Style 1 | 19 | 19 | Campnosperma |
| Tribe II Spondiææ Ovary 2 5 celled ovules pendulous Leaves pinnate | | | | | |
| Flowers polygamous 4 5 free above | Stamens 8-10 | Styles 20 | 20 | 20 | Spondias |
| Flowers bisexual connate at the lips | Stamens 10 | Style 5 thick | 21 | 21 | Dracontomelum |
| Doubtful genus | | | | | |
| Calyx 3 fid entire | Stamens 3 | Ovary 3 celled | Leaves 22 | 22 | ? Rumphia |

(Fl Br Ind Vol II pp 78)

The above analysis of the genera of Anacardiaceæ will be found useful in enabling the reader to recognise the plants of economic interest which belong to this family for fuller details consult their respective alphabetical positions in this work

1009

Distribution of the Anacardiaceæ—There are in all some 450 species belonging to the Anacardiaceæ as defined by the *Genera Plantarum*. They are chiefly inhabitants of the tropical regions of the Old World but are fairly represented in tropical America and less frequent in Australia. Only a few species (but these abundant in individuals) reach South Europe, South Africa, or North America. There are in India 116 species referred to 23 genera. Of these 83 or 71.5 per cent are peculiar to the plains, 28 or 24.8 per cent ascend to 5,000 feet in altitude and 5 or 4.3 per cent reach higher altitudes. In their distribution over the peninsula of India they show a corresponding preference for the moist and extra-tropical regions. Sixty-eight species or 58.6 per cent are peculiar to the eastern division of India, 17 or 14.6 per cent to South India and Ceylon, 7 are peculiar to North India (3 of these in the Upper Gangetic basin, 1 in the South Eastern Panjáb and 3 diffused over both these sub-divisions of North India but none of the endemic North Indian species seem to pass into the drier and desert tracts of the Eastern Panjáb and Sind). The remaining 12 Indian species are less local being diffused through at least two or more of the divisions of India, 11 of them

A 1009

Properties and Uses of the Anacardiaceæ

ANACARDIUM

passing to Upper India of which 3 occur in the East Panjáb and Sind and one species follows the coast of India appearing to require the sea atmosphere

Affinities of the Anacardiaceæ—They are placed in most works on systematic botany before the Leguminosæ and after Rutaceæ Zygophyllæ Simarubæ Burseraceæ Rhamnæ and Sapindaceæ to which they bear their closest relations Through Leguminosæ they have many features of resemblance to the Amygdalæ in Rosaceæ especially in habit woody stems alternate leaves perigynous stamens and polypetalous corolla the solitary carpel drupaceous fruit and exalbuminous seed They have a strong affinity to the Juglandæ indeed certain authors (Kunth Endlicher &c.) have combined the latter with the Anacardiaceæ (or Terebinthaceæ) De Candolle while retaining Burseraceæ excludes Juglandæ from them They are also closely related to Connaraceæ and Burseraceæ the latter by Baillon and other authors being viewed as a tribe they differ chiefly in the two-ovuled condition of Burseraceæ, the ovule having also a superior micropyle Baillon in addition to the above tribes places the Mappiæ and Phytocreneæ as tribes under this family Most modern authors including Sir J D Hooker exclude Burseraceæ Sabiaceæ and Juglandæ these forming respectively independent natural orders while Anacardiaceæ has been restricted to the tribes Anacardiæ and Spondiæ

1010

Properties and Uses of the Anacardiaceæ—They yield food medicine oil gum and resin turpentine varnish dye tan and useful woods The Pistachio nut the Mango the Cashew nut the Spanish Plum (Spondias) and the nut of *Semecarpus Anacardium* are regularly eaten and prized as amongst the best of Indian fruits The barks leaves young fruits seeds and oils obtained from these plants as also many others are regarded as possessing remedial properties The resin is often very valuable *Pistacia Lentiscus* yields the resin *mastic* much used in the East to perfume the breath strengthen the gums as also to flavour wines and confectionery In England it is used for varnishing pictures and in dentistry *P Terebinthus*, a Mediterranean tree yields Cyprus turpentine *Melanorrhœa usitatissima* yields the celebrated black varnish of Burma *Rhus succedanea* Japanese vegetable wax *R Vernix*, Japanese varnish the Indian *Holigarna longifolia* also yields a good varnish A large number of Indian species yield gum at certain seasons of the year *Odina Wodier* is simply covered with its brown gum streaking down the stem and ultimately becoming black

1011

Rhus coriaria and *R cotinus*, the Sumach are much prized tans, the wood of the last species yielding a good orange dye In Europe a tincture is chiefly used for this purpose with Cochineal or Prussian blue it gives chamois or green tones The juice of the pericarp of *Semecarpus* gives an indelible black ink used for marking linen

1012

ANACARDIUM, *Rotlb Gen Pl, III 420*

1013

A genus of shrubs or trees belonging to the Natural Order ANACARDIACEÆ comprising 6 species natives of America one of which has been naturalised in India

Leaves alternate simple quite entire *Panicles* terminal bracteate *Flowers* small polygamous *sepals* and *petals* not accrescent *Calyx* 5 partite *sepals* erect deciduous *disk* erect filling the base of the calyx *Petals* 5 linear lanceolate recurved imbricate. *Stamens* 8-10, all or only a few fertile; *filaments* connate and adnate to the disk *Ovary* obovoid or obcordate *style* filiform excentric *stigma* minute *ovule* 1 ascending from a lateral funicle *Nut* kidney-shaped seated on a large pyriform fleshy body formed of the enlarged disk and top of peduncle, pericarp cellular and full of oil *Seed*

A. 1013

**ANACARDIUM
occidentale****The Cashew-nut.**

kidney-shaped ascending *testa* membranous adherent *cotyledons* semi lunar
radicle short hooked

The generic name is derived from *aya* resemblance and *καρδία*,
heart in allusion to the form of the nut

1014 *Anacardium occidentale*, Linn *Fl Br Ind*, II, 20

THE CASHEW NUT

Vern—*Kaju* HIND GUJ DEC *Hijli bādam kaju* BFNG *Kaju kaju*
kaliyā BOMB *K jucha bi kaju* MAR *Mundiri kottai kottai*
mundiri TAM *ḡidi mamidi vittu muntamamidi-vittu ḡidi ānti*
ḡiedi pundu (fruit) TEL *ḡidi vāte kempu ḡeru biya gera poppu ḡeru*
vate ḡerabiya KAN *Paranki-mava kuru kappal chērun kuru kappa*
mavakuru MALA *Kaju or kaju atta* SINGH *Thee noh thayet thee*
hot sihosayesi or tihotiya si BURM

Habitat—A tree 30 to 40 feet originally introduced from South
America now established in the coast forests of India Chittagong
Tenasserim and the Andaman Islands and over South India

The local name *kaju* appears to be restricted to the Konkan The tree
is indigenous to the West Indies It is probable that the Portuguese on
its introduction to the west coast of India called it *kaju* as a rendering of
the Brazilian name *acajau* The French by a similar transliteration
called it *Cashew* (*Bomb Gaz* X 38)

Properties and Uses—

GUM **1015** **Gum**—Rai Kanai Lal De Bahadur in his *Indigenous Drugs of India*
mentions that the bark of this plant yields a gum

§ This gum occurs in large stalactitic pieces it is yellow or reddish
and only slightly soluble in water It is obnoxious to insects (*Surgeon*
Major Dymock Bombay)

Sap **1016** **The sap**—The juice issuing from incisions in the bark is in demand as
an indelible marking ink (*Br Burm Gaz* I 136) The astringent juice
is used by native workmen as a flux for soldering metals (*Bomb Gaz*
X p 38)

DYE **1017** **Dye**—The bark may be used for tanning The pericarp gives an oil
called *Cardol* which is very astringent and is used by the Andamanese
to tan or colour fishing nets so as to preserve them Dr Dymock informs
me that this oil is called *Dik* in Goa where it is much used as a tar for
boats and nets

Oil—From this plant two distinct oils are obtained —

1st—The kernels when pressed yield a light yellow bland oil very
nutritious the finest quality in every respect equal to almond oil and
considered superior to olive oil The yield is about 40 per cent The
kernels are so extensively eaten in India however that it is almost
impossible that a trade could at present be done in this oil Samples
of this fixed oil and information as to methods of preparation and extent
of trade are much required The kernels have been once or twice
exported to Europe under the name of *Cassia Nuts*

2nd—*Cardole* or *Cashew-apple-oil*—This is prepared from the pericarp
or shell of the nut It is black acrid and powerfully vesicating In the
Andamans, it is used to colour and preserve fishing lines It is an effect-
ive preventive against white-ants in carved wood work books &c The
yield is 29½ per cent (*The British Burma Gazetteer* I, 131, says
“The pericarp of the nuts produces a black acrid oil *Cardole*”)

Medicine.—The medicinal uses of this plant are many The acrid oil
is used as an anæsthetic in leprosy and as a blister in warts corns and
ulcers Between the laminae of the shell of the kernel there is a black
caustic fluid, which contains an acrid, oily principle, *Cardol*, and a

OIL
from the nut
1018

Cardole or
oil from the
shell
1019

MEDICINE
Acrid oil.
1020

A. 1020

The Pellitory of Spain.

ANACYCLUS
Pyrethrum.

peculiar acid *Anacardic Acid* It possesses powerful rubefacient and vesicant properties The spirit distilled from the expressed juice of the fruit may be used as a stimulant

§ Fruit eaten as a remedy for scurvy The juice of the nut is used as a substitute for iodine locally' (*Surgeon W Barren Bhuj Cutch Bombay*) The oil I have used with benefit in the anæsthetic variety of leprosy (*Assistant Surgeon Bolly Chand Sen Calcutta*) The oil obtained from the shell by maceration in spirit is the very best application for cracks of the feet so common with natives (*Brigade Surgeon C Foynt M D Poona*) It is locally applied to the sole of the foot as a remedy for cracking of the cuticle (*Surgeon Major Henry David Cook Calicut Malabar*) The oil is efficacious when faintly brushed as a local stimulant in psoriasis (*Assistant Surgeon Devendro Nath Roy Calcutta*)

Food—Produces a small fruit within which is the nut known as the Cashew nut commonly eaten roasted—a process which improves the flavour § The ripe fleshy stalk or torus of this plant is eaten as a fruit In Puri they used to call it *laika am* The kernels are fried and eaten they are also made into confectionery with sugar They are sold in the markets in Puri under the name of *Hidjls badam* (*U C Dutt Serampore*) The seeds deprived of their shell are eaten (*Deputy Surgeon General G Bidie Madras*)

Structure of the Wood—Red moderately hard close grained Weight 38 lbs per cubic foot

Used in Burma for packing cases for boat building and charcoal

ANACHARIS, *I C Rich Gen Pl, III 450*

Anacharis or American duckweed A delicate much branched aquatic plant belonging to the Natural Order HYDROCHARIDÆ By the *Genera Plantarum* this genus has been reduced to *Elodea*, *Mich*

This curious plant made its appearance simultaneously in various parts of Great Britain about 30 years ago and its spread from lake to lake has attracted much attention How it was introduced is unknown and it is equally difficult to know how it is propagated with such rapidity for the plant is dioecious and only female flowers have been discovered in Great Britain it cannot therefore produce fertile seeds The date of its introduction into India seems equally difficult to determine but at the present moment most of the tanks and lakes of the plains have become almost impassable of navigation from the immense masses of this plant which choke up every piece of water under 8 to 10 feet in depth It affords rare feeding ground for aquatic birds both from the tender leaves which are greedily eaten and from the multitude of insects and snails which live amongst the portions of the plant which reach above the surface of the water I have failed to discover any vernacular name for it other than the generic appellation to all aquatic weeds It is sometimes used along with *Vallisneria* in the native process of refining sugar

ANACYCLUS, *Linn Gen Pl II, 419*

Anacyclus Pyrethrum, *DC COMPOSITÆ, DC Prod VI 15*

THE PELLITORY OF SPAIN

Vern.—*Akarkarâ* HIND BENG BOMB *Akhalkarâ akhrakaram* TAM and TEL *Akhalkâdhâ* MAR *Akhala-karâ* KAN *Akorkaro* GUJ *Agal-gôru* DUK *Akî karukâ akilâ kâram* MUL *Aâgarqarhâ* or *aqarqarhâ, aûdul-qarha udal qarha*, ARAB, *Akara karawa akarâka rabha* SANS.

Spirit
1021

FOOD
Nuts
1022
Receplac.
1023

TIMBER
1024

1025

1026

ANADENDRON

The Anadendron.

Habitat.—Indigenous to North Africa whence it has been introduced into South Europe. The root is collected chiefly in Algeria and is exported from Oran and to a smaller extent from Algiers. A large amount is also shipped from Tunis to Leghorn and Egypt (*Dymock*)

MEDICINE

Root

1027

Medicine—THE ROOT of this plant has stimulant properties and when locally applied acts as an irritant and rubefacient. It is also used as a sialagogue. In India it is often given to parrots with the idea of helping to make them talk. It is imported into India chiefly from Algeria (*Ainslie* (*Mat Ind I* 300) gives a long account of this medicine. He informs us that vegetarians prescribe an infusion of it in conjunction with the lesser galangal and ginger as a cordial and stimulant in lethargic cases in palsy and in certain stages of typhus fever and that they also order it to be chewed as a masticatory for toothache. It certainly possesses powerful stimulant properties but is scarcely ever employed in Europe as an internal remedy though it has been found useful as a sialagogue and as such *Dr Thomson* says has been given with success in some kinds of headache, apoplexy chronic ophthalmia and rheumatic affections of the face

Infusion

1028

Special Opinions—§ The root is used by natives as a nervine tonic in cases of facial palsy paralysis hemiplegia epilepsy and cholera. It is also employed in rheumatism sciatica and dropsy. As a sialagogue it is used to allay toothache. Aphrodisiac emmenagogue and diuretic properties have also been assigned to it. Its local application to the forehead is said to remove headache. A gargle is reputed to be very efficacious in affections of the teeth throat and tonsils. In a drachm and a half doses it is said to act as a purgative. Dissolved in olive oil and rubbed over the skin it is reported to produce profuse perspiration, and thus to cut short an attack of fever. As an expectorant it has been employed with benefit in cases of chronic bronchitis (*Assistant Surgeon Gholam Nabi*). It is used in toothache in which it sometimes gives instantaneous relief (*Surgeon F C Penny M D Amritsar*). It is expectorant (*Surgeon Major F T Fitzpatrick M D Coimbatore*). Decoction used in bronchitis as an expectorant (*Surgeon Major F F L Ratton M D Salem*). Decoction of it is used by native practitioners as a gargle in sore throat (*Brigade Surgeon S M Shircore Moorshedabad*). Is a powerful sialagogue and I have seen it give relief in rheumatic pains in the face (*Surgeon Major John North Bangalore*). Frequently given to infants in the Deccan and the Konkan from the idea of its assisting to make them talk. As a stimulant the dose is one to five grains (*Surgeon W Barren Bhuj Cutch Bombay*). Is used by the natives of India as an aphrodisiac. Applied in the form of a powder to a carious tooth it is said to remove toothache useful in flatulent dyspepsia as a carminative (*Assistant Surgeon Jaswant Rai Mooltan*)

Gargle

1029

Decoction

1030

Powder

1031

1032

ANADENDRON, *Schott Gen Pl III, 991*

Anadendron, sp, AROIDEÆ

Vern.—Yolba AND

FIBRE

1033

Fibre—In the Andaman Islands, bow strings are made from the fibre of the bark of this plant to which to increase strength a coating of black bee's wax (*Tobul pid*) is frequently applied. Netted reticules are also prepared from this fibre which are used by women for carrying small objects (*Mr Mann's Andaman and Nicobar Islands Catalogue, Calcutta Exhibition*)

A. 1033

Cocculus Indicus.

ANAMIRTA
Cocculus.

ANAGALLIS, Linn Gen Pl II, 637

A genus of slender herbs belonging to the Natural Order PRIMULACEÆ comprising some 12 species inhabitants of the north temperate zones occurring on the temperate Himalaya

The generic name is derived from *ana* again and *agallao* to make glorious or to cause mirth from its fabled virtue to remove sadness This name was most probably suggested from the beauty of the flowers or from the fact that as the sun rises and sets so the sparkling Anagallis opens and closes hence the popular name Poorman's weather glass

Anagallis arvensis, Linn var cœrulea, Fl Br Ind III, 506

Vern — *Jonkhmar jainghani* N W P

Habitat — Found on the mountains of Bengal and of the North West India and the Himalaya generally from Nepal westward ascending to 8000 feet common in the neighbourhood of Simla on rubbish heaps and walls around fields Central India the Nilgiri Hills and Ceylon (perhaps introduced)

Medicine — Used to intoxicate fish and to expel leeches from the nostrils (For this purpose the juice of the various species of *Begonia* would also seem admirably suited — see *Leech*) It is used in cerebral affections leprosy hydrophobia dropsy epilepsy and mania Formerly it was used in Europe in epilepsy mania hysteria delirium enlargement of the liver spleen dropsy emaciation stone the plague bites of serpents and mad animals and in numerous other diseases

Said to be poisonous to dogs producing inflammation of the stomach (*Baden Powell Panjab Products I 368*)

ANAMIRTA, Colebr Gen Pl I 35

A climbing shrub (belonging to the Natural Order MENISPERMACEÆ) a native of Eastern Bengal the Khásia hills and Assam and from the Konkan to Orissa and Ceylon

Flowers panicled **Sepals** 6 with 2 adpressed bracts **Petals** 0 **Male flowers** anthers sessile many arranged upon a vertical column 2-celled bursting transversely **Female flowers** staminodes 9 clavate 1 seriate **Ovaries** 3 on a short gynophore **stigma** subcapitate reflexed **Drupe** on a 3 fid gynophore obliquely ovoid dorsally gibbous **style** scar sub basal **endocarp** woody **Seed** globose embracing the sub globose hollow intruded endocarp **albumen** dense composed of horny granules **embryo** curved **cotyledons** narrow-oblong thin spreading

Anamirta Cocculus, W & A Fl Br Ind, I, 98

COCCLUS INDICUS OF PHARMACY

Vern — *Kákmarí kákmarí ká-bín* HIND DUK *Kakamari SANS* BENG *Káka-phala wátols kákphal* BOMB *Kakk y kollí-virai or káká kollí virai* TAM *Kaki champa kaku mari vittu* TEL *Kakamari-bija* KAN *Karanta kattin kaya, polluk-kaya* MALA *Tittaval* SINGH *Tuba bidji* MALAY

Habitat — A climbing shrub of South and East India, Burma and Oudh forests

Oil — The fruit contains a large quantity of fixed oil The fat expressed from the seeds which amounts to about half their weight, is used in India for industrial purposes

Medicine — The bitter berries of this plant are used in India to poison fish and crows. In medical practice they are never administered internally, but are sometimes used in the form of an ointment This ointment is employed as an insecticide, to destroy pediculi &c and in some obstinate forms of chronic skin diseases (*Bentley & Trimen*)

A. 1042

1034

1035

MEDICINE
The Plant.
1036

1037

1038

OIL.
1039
Fat from
Seeds
1040
MEDICINE
Berries
1041
Ointment,
1042

**ANANAS
sativa****The Pine Apple**

The Surgeon General of Madras proposed to exclude this drug from the new edition of the *Pharmacopæia of India* (*Home Department Official Correspondence*)

Dr Dymock (*Mat Med W India* 20) says This plant which is a large climbing shrub with rough bark abounds on the western coast of India Its properties have been known to the Hindus from an early date and the fruit appears to have been long in use as a remedy in certain skin affections possibly of parasitic origin The Arabs were probably also acquainted with it but there is no satisfactory evidence upon this point to be gathered from their writers upon materia medica

§ The berries of *Anamurta cocculus* are an active poison in large doses but not in small ones I have taken the drug myself up to five grains, three times a day without any effect good or bad The cheapest and most convenient way of using it externally is in the form of oily solution with cocoanut oil in the proportion of one drachm of the former to one ounce of the latter (*Honorary Surgeon Moodeen Sheriff Khan Bahadur Madras*)

Oily solution
1043

Chemical Properties —§ The poisonous properties of the seeds are due to Picrotoxin $C_{12}H_{14}O_6$ The neutral principle readily crystallises and has an intensely bitter taste in consequence of this fact *Cocculus Indicus* has been employed as a substitute for hops in the manufacture of beer In addition to Picrotoxin two other crystalline principles have been described as existing in the berries *Menispermine* and *Paramenispermine* (*Surgeon C F H Warden Calcutta*)

I 044

ANANAS, Adans Gen Pl, III 662

A genus of almost stemless plants with a rosette of lanceolate leaves belonging to the Natural Order BROMELIACEÆ and comprising some 5 or 6 species inhabitants of tropical America

Inflorescence densely crowded and spirally arranged into a strobiliform head *Bracts* and *ovary* with the receptacle developing into a succulent compound fruit *Sepals* and *petals* distinct on the apex of each ovary

The generic name is supposed to be a Latinised form of the Guiana or South American name *Nanas*

1045

Ananas sativa, Linn**THE PINE APPLE**

Vern —*Ananas anannas* HIND *Ananash* (vulgarly *andras*) BENG
Ananas GUJ MAR *Anashap-pasham* TAM *Anaso-pandu* TEL
Ananasu hannu KAN *Annanas katta chakka* MALA. *Aainunnas*
ARAB and PERS *Annasi* SINGH *Nanna ti* BURM

Habitat —This and all the other members of the same order now met with in India have been introduced from America From the vernacular names of this species one would suppose it had reached India through Persia

History —A perennial universally cultivated in all tropical and sub-tropical countries The pine apple was unknown to Europe Africa and Asia prior to the discovery of the Western Continent It is apparently a native of Brazil and it was first made known to Europe by *Goncalo Hernandez* in 1513 it was introduced by the Portuguese into Bengal in 1594 Its introduction is expressly mentioned by Indian authors such as *Abul Fuzl* in the *Ay en Akbari* and again by the author of *Dhara Shekosh* (*Royle*) The rapidity with which it spread through Europe Asia, and Africa is unparalleled in the history of any other fruit It seems to have met with universal acceptance hence apparently the purity with which its American name *Anas* or *Nanas* has passed through

A. 1045

The Pine Apple

ANANAS
sativa.

so many languages. The Asiatic recipient of a living plant seems to have carried off and adopted as his own the name by which so valuable a treasure was made known to him. The first pine apples which appear to have reached England were those presented to Cromwell. The next notice is of the Queen pine presented to Charles II on the 19th July 1688 having been sent from Barbados and the first pine apple grown in England seems to have been reared from the rejected crowns of these. It was first systematically cultivated in Europe by M. Le Cour a Dutch merchant near Leyden. It was first fruited in England in the year 1712 since then its cultivation may be said to have become universal all over Southern Europe. The largest pine apple on record was reared in England and it weighed over 14 lbs.

Properties and Uses—

Fibre—The leaves which require to be steeped in water for 18 days yield a beautiful fibre which but for the difficulty of extraction would be largely used. This fibre is in request in India for threading necklaces as it does not rot and is very strong. Both the wild and cultivated pine apple yield fibres which when spun surpass in strength fineness and lustre those obtained from flax. It can be employed as a substitute for silk and as a material for mixing with wool or cotton. For sewing thread twist trimmings laces curtains and the like its particular qualities render it specially applicable (*Chambers Journal*). In 1839 Miss Davey in answer to an advertisement published by the Agri Horticultural Society of India submitted some thread made from pine apple leaves of which she remarked that it was equal to the finest flax thread manufactured in Europe and considered it comparable to the best cambric thread. This lady with some difficulty owing to the conservative objections of the Dacca weavers whom she tried to induce to make some cloth from this fibre manufactured handkerchiefs cuffs and some cloth which are alluded to in the Proceedings of the Society as elegant specimens. Some thread was sent home but the English spinners seem to have been as prejudiced against this fibre as the Dacca weavers were.

In the Agri Horticultural Society's Journal for 1853 some trials of various fibres made by Harton & Co. Calcutta are published a $\frac{1}{4}$ inch in circumference rope made of pine apple fibre easily bore a weight of 42 cwt and broke only with a weight of 57 cwt (*Tropical Agriculturist* III 522). In *Royle's Fibrous Plants of India* will be found some interesting information regarding the pine apple of which the following may be given as an abstract of the more important facts. It has become quite naturalised in some parts of this country. It flourishes in Assam and is very abundant on the Khasia hills. Captain Turner found it plentiful at the foot of the Himalaya. According to Dr Helfer the pine apple is so abundant in Tenasserim as to be sold in Amherst Town in June and July at the rate of one rupee for a boat load. The natives know it only by the American name which they transform into *Nana ths* or *Nanna* fruit. The pine apple of the Philippine Islands is much valued for its fine hair like fibres of which the famous pine apple cloth is manufactured. M. Perottet considers this to be a distinct species and has named it *Bromelia Pigra*. Mr Bennett visited a plantation near Singapore made by a Chinaman who prepared the fibre for export to China, where it is used 'in the manufacture of linens. The leaves in the green state were laid upon a board and the epidermis removed with a knife. The fibres were then easily detached by the hand on being raised with a broad knife. The separation of the pine apple fibre is practised in many parts of the East Indies. The natives of Burma however do not seem to have been acquainted with the *Ananas* fibre although the plant is very abundant there. From some experiments

FIBRE
1046Thread
1047Silk
substitute.
1048Pine Apple
Cloth
1049

| ANANAS sativa. | The Pine Apple. |
|---------------------------|---|
| Ropes 1050 | <p>which were made by Dr Royle, it appears that a certain quantity of the fibre prepared at Madras bore 260 lbs and a similar quantity prepared in Singapore bore 350 lbs while New Zealand flax bore only 260 lbs Mr Zincke took out a patent for the manufacture of thread from this fibre Bleaching destroys the adhesion between the bundles of fibres and renders it fit to be spun in the same way as flax Twine cord and fishing lines are also sometimes made of it Pine apple ropes are said to bear constant immersion in water a property which is increased by the natives in some places by tanning the fibre (<i>Fibrous Plants of India</i> pp 37 41)</p> |
| Twine 1051 | <p>Mr Thomas Christy in his <i>New Commercial Plants</i> (No 6 page 40), says that in Rungpore shoemakers largely use the fibre for twine but that the plant is chiefly cultivated there for its fruit the fibre being but little appreciated He also says The filaments of pine apple are very fine and flexible and also resistant They are easily divided after treatment in the alkaline bath and after being submitted to trituration The isolated fibres are very fine of a tolerably regular diameter from one end to the other but of very different size The inferior canal which is very perceptible in the largest is not so in the smaller ones They are very flexible curling and crisping readily under mechanism The points are rarely sharp and taper gradually to the extremities They are rounded or rather blunt at the end</p> |
| MEDICINE Juice 1052 | <p>Medicine—In India the fresh juice of the leaves is regarded as a powerful anthelmintic and that of the fruit as an antiscorbutic A friend informs me that the natives regard the fresh juice of the fruit as poison-ous if hypodermically injected</p> |
| Leaf juice 1053 | <p>Special Opinions—§ The pure juice of the ripe fruit is said to allay gastric irritability in fever The fresh juice of the leaves given with sugar is said to relieve hiccup (<i>Surgeon Major Bankabehari Gupta Puri</i>) Raw pine apple is used to produce criminal abortion (<i>Surgeon Major Henry David Cook Calcutt Malabar</i>) It is antiscorbutic cholagogue The green fruit is emmenagogue produces abortion (<i>Assistant Surgeon Devendra Nath Roy Calcutta</i>) The fresh juice of the white portions of the leaves mixed with sugar is used as a purgative and anthelmintic The juice of the ripe fruit is diuretic diaphoretic and refrigerant In large quantities it is believed to have the property of causing strong uterine contractions (<i>Brigade Surgeon J H Thornton B A M D Monghyr</i>)</p> |
| Fruit 1054 | <p>The fruit is antiscorbutic and the fresh juice of leaves anthelmintic (<i>Surgeon C J W Meadows Burrisal</i>) The juice of the ripe fruit is useful in jaundice (<i>Assistant Surgeon K N Acharji Dacca</i>) Used in animal abortion fruit eaten (<i>Surgeon Major J J L Ratton, Salem</i>)</p> |
| FOOD Fruit. 1055 | <p>In the Straits of Malacca the juice of the leaves is used to produce abortion also as an emmenagogue The ripe fruit eaten freely has the same effect in a less degree (<i>Honorary Surgeon P Kinsley Ganjam, Madras</i>) Besides its value as an antiscorbutic it seems to have an irritant action on the uterus as it is reported to have caused abortion in weakly or predisposed women (<i>Surgeon Major R L Dutt M D, Pubna</i>) Its preserve is much employed by the hakims as an excellent nutritive and tonic (<i>Surgeon Mokund Lal Agra</i>)</p> <p>Food.—The pine apple is generally regarded as one of the most delicious fruits met with in tropical regions To avoid the dangerous consequences attributed to it however, many persons will only eat it when stewed, while others prefer to eat it fresh with a little sugar or even salt During the season in Calcutta good pine apples can be purchased for a pice each (1 <i>¢.</i>, less than a halfpenny) The pine apples of Burma and of the Straits are, of the Indian forms, those most prized</p> |

Andrographus

ANDROGRAPHIS

§ On the Malabar coast near Mahé and in British Burma near Myanong the pine apple is remarkably abundant. In the former tract the natives have a prejudice against eating the fruit from an idea that it is poisonous and they consequently destroy it or give it away. In Myanong *Monsieur d'Avera* is trying to make use of the large quantities that grow there to manufacture champagne. I am in correspondence with him on the subject and he seems hopeful of success. Should the experiment succeed it could be repeated on the Malabar coast (*Mr L Liotard*)

Pine apple
champagne.
1056

Chemical Note —§ The oil or essence of pine apple used for flavouring purposes in confectionery is a solution of ethylbutyrate in alcohol. This compound has also been employed to give the pine apple flavour to Jamaica rum (*Surgeon Warden Prof of Chemistry Calcutta*)

Chemically
prepared
Pine apple
juice.
1057

Anatherum muricatum, Retz see *Andropogon muricatus*, Retz

ANCHUSA, Linn Gen Pl II 2, 855

Anchusa tinctoria, Linn BOBAGINÆ

Syn for *Alkanna tinctoria*, Taush

Mr Baden Powell mentions an oil as obtained from this plant. Other references to the root of this plant occur in works on Indian Economic Science. It is incorrectly described as yielding the *Ratanjote*, (see *Onosma echioides*, Linn). *Anchusa* is not indigenous to India and could only occur in gardens at hill stations.

1058

ANCISTROCLADUS, Wall

Ancistrocladus Vahl, Arn Fl Br Ind I 299 DIPTEROCARPÆ

Vern — *Cona-mel* SINGH

Habitat — Central and Southern parts of Ceylon up to an altitude of 2000 feet

Fibre — Dr Trimen informs me that the long tough stems are used as jungle ropes

1059

Fibre
1060

ANDRACHNE, Linn Gen Pl III, 270

Andrachne cordifolia, Mull Arg EUPHORBIACÆ

Vern — *Kurkni gurguli kurkuli* PB *Kurkni gurguli* JHELAN *Bersu* CHENAB *Barotri madare* RAVI *Mutkar chirmutti* pin BEAS *Tsdtn* SUTLEJ

Habitat — A small shrub met with in North West Himalaya from the Indus to Nepal ascending to 8000 feet

Poison — The twigs and leaves are said to kill cattle when browsed in the early morning on an empty stomach (*Dr Stewart*)

Structure of the Wood — White moderately hard, close-grained. Weight 45 lbs per cubic foot

POISON
1062
TIMBER.
1063

A. trifoliata, Roxb Fl Ind Ed C B C 703

Syn for *Bischofia javanica*, Bl (*Gamble's Man Tymb*, 335) which see

ANDROGRAPHIS, Wall Gen Pl, I, 1099

An Indian genus of annual herbaceous or shrubby plants erect or procumbent, belonging to the Natural Order ACANTHACEÆ and comprising some 19 species

A. 1063

**ANDROGRAPHIS
paniculata****The Creat.**

Leaves entire *Corolla* small tubular 2 lipped white or pink with dark purple lower lip pubescent *Ovary* 6 12 ovuled thinly hairy *style* slender tip minutely bifid *Capsule* linear-oblong or elliptic compressed contrary to the septum 6 12 seeded *Seeds* osseous sub quadrate or oblong not compressed rugose pitted glabrous

The generic name is derived from *avhp* a stamen, *γραφίς*, a writing style in allusion to the form of the filaments

1064

Andrographis paniculata, Nees, *Fl Br Ind III* 501 Wight,
l.c. 518 ACANTHACEÆ

THE CREAT

Syn — *JUSTICIA PANICULATA* Roxb *Fl Ind Ed C B C* 40

Vern — *Kiryat charayetah mahatita* HIND *Kalmegh mahatita* BENG
Olenkirayat MAR *Kiryata olikiryat kiryato kariyatu* GUJ, *Charay etah kalafnuth* DUK *Nila-vembu shirat kuchchi* TAM *Nela vemu* TEL *Nila veppu kiriyattu* MALA *Nela bevinagida kreatera* KAN
Kirata bhunimba SANS *Qasabussarrah qasabhuva* ARAB *Naine havandi* PERS *Nin bin kohomba* SINGH

Dr Moodeen Sheriff says that *kara kanniram* or *cara cantram* is the Malayan name found in *Hortus Malabaricus* which means the ack *Strychnos Nux vomica* and which he considers as neither correct nor safe to be applied to this plant

Habitat. — An annual common in hedgerows throughout the plains of India, from Lucknow to Assam and Ceylon Cultivated in gardens in some parts of India

Botanic Diagnosis — *Leaves* lanceolate glabrous *Racemes* lax paniculate divaricate *pedicels* manifest *Capsules* thrice as long as broad nearly glabrous

MEDICINE

Alul
1065

Roots
1066
Leaves
1067

Medicine — This bitter shrub is well known under the name of *Kalmeg* and forms the principal ingredient of a household medicine called *Alul* extensively used in Bengal The expressed juice of the leaves to gether with certain spices such as cardamoms cloves cinnamon &c dried in the sun is made into little globules which are prescribed for infants to relieve griping irregular stools and loss of appetite The medicinal properties of this plant are many The roots and the LEAVES are febrifuge stomachic tonic alterative and anthelmintic According to **Murray** the plant is very useful in general debility dysentery and certain forms of dyspepsia **U O Dutt** says that there is some doubt as to the Sanskrit name of this plant The name *Yavatiktta* with its synonyms *Mahatiktta sankhina* are by some supposed to refer to this plant but **Dutt** is of opinion that it was not used in Sanskrit medicine Great confusion exists between this plant and chiretta and samples of the latter are frequently adulterated with *Kalmeg* **Flückiger** and **Hanbury** point out that this plant has been wrongly supposed to be an ingredient in the famous bitter tonic called by the Portuguese of India *Droga Amara*

Drs Carter Dymock, and **Sakharam Arjun** reported on this drug as follows A bitter tonic and stomachic It is used in general debility, in convalescence after fevers and in advanced stages of dysentery It is also used as a tonic stimulant and gentle aperient in the treatment of several forms of dyspepsia, and in the torpidity of the alimentary canal The expressed juice of the leaves is a common domestic remedy in the bowel complaints of children Dose 1 to 2 ounces of the infusion and 1 to 4 drachms of the tincture (Home Department Official Correspondence)

It is officinal in the *Pharmacopœia of India* where directions will be found as to the preparation of a compound infusion and compound tincture **Irvine**, in his *Mat Med of Patna* says that the root is used as

Expressed
Juice
1068
Infusion
1069
Tincture
1070

A 1070

The Lemon Grass Family

ANDROPOGON

a stomachic bitter and in the *drogue amere* ' The dose is from 3ss to ʒi in infusion

Chemical Composition.—The intensely bitter taste appears to be due to an indifferent non basic principle since the usual reagents fail to indicate the presence of an alkaloid Tannic acid produces an abundant precipitate The infusion is but little altered by salts of iron It contains a considerable quantity of chloride of sodium (*Fluck & Hanb, Pharm acog Bent & Trim 195*)

§ The Vanadees a wandering gipsy tribe in the Madras Presidency constantly carry a supply of pills made of Creat fresh leaves and the pulp of the ripe tamarind which they consider antidotal to the venom of the cobra A pill made into a paste with water is applied to the bitten part and some of it is put into the eyes two pills are given for a dose every hour or two internally (*Honorary Surgeon P Kinsley Chcacole Ganjam Madras*) Creat leaves with the leaves of Indian birthwort (*Aristolochia indica*) and the fresh inner root bark of country sarsaparilla made into an electuary is used by native hakims as a tonic and alterative in syphilitic cachixia and foul syphilitic ulcers I have seen many cases successfully treated by this electuary (*Honorary Surgeon Easton Alfred Morris Negapatim*) The green leaves are given with aniseed (4 to 20) as stomachic and anthelmintic (*Assistant Surgeon Devendro Nath Roy Calcutta*) This is called Indian Chiretta and is used as a tonic (*Surgeon Major Lionel Beech Cocanada*) Decoction of all parts of the plant acts as a mild antiperiodic (*Surgeon Major John Lancaster M B Chittore*) It is efficacious in certain forms of skin diseases especially in eczema (*Assistant Surgeon F N Dey Feypore*) Febrifuge, used in infusion (*Surgeon Major F J L Ratton Salem*)

Pills
1071

ANDROPOGON, Linn Gen Pl III 1133

1072

A genus of grasses (GRAMINEÆ) belonging to the tribe ANDROPOGONEÆ of which about 25 species are met with in India.

Spikes polygamous arranged in pairs (or many) on a common slender peduncle at the bent basal node of which occurs a large leafy bract which in bud encloses the pair of spikes *peduncles* arising from the zig zag flattened branches of a panicle *Panicles* pendulous single or clustered from the axils of the upper leaves *Spikelets* articulated to the rachis of the spike in pairs the one sessile and hermaphrodite (or rarely feminine) the other pedicellate exaristate and masculine rarely hermaphrodite sterile or reduced to empty glumes Terminal spikelets often in threes the middle fertile one lateral male and the other neuter *Glumes* sub-equal often longer than the hermaphrodite flowers the lowest largest those of the stalked spikes many veined often sessile the lower glume is flattened on the back against the rachis and veinless *Pales* very small the lowest deeply bifid from the sinus of which arises a long awn

The species of economic interest met with in India belong chiefly to the section which corresponds to the sub genus CYMBOPOGON characterised by their large bracts and by the venation of the glumes The generic name is derived from *αἶψα* a stamen and *πῶγων*, a beard, in allusion to the bearded appearance of the stamen

The greatest confusion exists in the identification of the plants yielding the essential oils from this genus In all collections intended for museum specimens, the plants (in flower) should, if possible accompany the oils so as to secure accurate identification In fact, until such collections have been made it will be impossible to remove the unavoidable errors which must creep into all pure compilations of the literature of a subject so difficult as that of the economic uses of the Indian species of *Andropogon*.

ANDROPOGON
citratus**The Lemon Grass**

- 1073** **Andropogon aciculatus**, *Roxb*, in *Fl Ind*, *Ed C B C*, 88 (given as *Linn Sp Pl Ed Willd*, IV 906)
 Syn for **Chrysopogon acicularis**, *Retz* *Duthie's List* p 22 (the *chora kanta* of Bengal)

- 1074** **A. ampliflorus**, *Stend* Met with in the North West Himálaya

- 1075** **A. ariani**, *Edgew* Met with in the sandy deserts of the Panjáb

- 1076** **A. Bladhii**, *Retz*

Syn — **LEPEOCERIS BLADHII** *Nees*

Vern — *Loari* BENG *Donda* or *dhunda nilon janewar* (Captain Wingate's Report for 1876 on the grass farms of Allahabad and Cawnpore) N W P

Habitat — Described by *Roxburgh* as a native of hedges and roadsides but chiefly of old pasture grounds *Duthie* says it is found in the plains of the North West Provinces and the Panjáb

FODDER
1077

Fodder — Captain *Wingate* in the report quoted above seems to speak highly of this as a fodder grass He says At Allahabad the indigenous grass is not *dhoob* but *janewar* **Andropogon Bladhii**, and *unjan* **Pennisetum anchroides** These two grasses may be seen in their perfection in the Alfred Park of this station in the early part of October General Sir *Herbert Macpherson* in a report of a silo experiment in the Allahabad fort with this grass says Both *janewar* and *unjan* are first rate fodder grasses

- 1078** **A. brevifolius**, *Sw*

Syn — **A. EXERTUS** *Stend* **POLLINIA BREVIFOLIA** and **VAGINATA** *Spreng*

Collected at Hazaribagh (altitude 2 000 feet) by *Mr C B Clarke*

- 1079** **A. citratus**, *DC*

THE LEMON GRASS

Syn — **CYMBOPOGON CITRATUS** *DC* **A. SCHÆNANTHUS** *Wall Plant Asiatic Rariores III* t 280 **A. SCHÆNANTHUS** *Roxb in Dals and Gib Bomb Fl Sup* 99 *Rheed Hort Mal* 12 t 72 **A. SCHÆNANTHUS** *Linn as in Roxb Fl Ind Ed C B C* 92 *Voigt Hort Sub Calc* 706 and *U C Dutt Mat Med Hindus* 271

Vern — *Gandha bena* BENG *Gandha trina* HIND *Hirvacha* or *olancha* MAR *Lilicha* *Isalacha* GUJ *Hasár ma sóláh* DUK *Vashanup-pulla* *kurpura-pulla* TAM *Nimma gaddi* *chippa gaddi* TEL *Vasanap pulla* *shambhara-pulla* MALA *Pur hali hulla* KAN *Chae kashmiri* PERS *Bhustrina* SANS *Penguin* SINGH

The vernacular names *Gandha bená* BENG and *Malutrinukung bhústrinung* SANSKRIT are by *Roxburgh* given to a plant he describes as **A. Schœnanthus**, *Linn* This may probably be **A. citratus** *DC* but it seems to agree equally well in certain respects with **A. laniger**, *Desf*

Habitat — A large coarse, glaucous grass found under cultivation in various islands of the Eastern Archipelago and in gardens over an extensive tract of country in India and Ceylon, it rarely or never bears flowers It is also largely cultivated in Ceylon and in Singapore for its odoriferous oil I have seen it in flower more than once" (*Dr Dymock Bombay*)

OIL
1080

Oil — The lemon grass yields lemon-grass oil, verbena oil, or Indian molissa oil

A. 1080

The Lemon Grass.

ANDROPOGON
citratrus.

This oil is chiefly employed in Europe in adulterating true verberna oil. It is largely employed to perfume soaps and greases. The annual production of otto of lemon grass in Ceylon is above 1 500 lbs valued at 1s 4d per ounce. There is a large consumption of this otto in the manufacture of Eau de Cologne. This oil is said to be more costly and less extensively produced than citronella. It is chiefly manufactured in Ceylon and Singapore. More than half the annual exports go to America. In 1875 Ceylon exported 13 515 ounces of this oil. In India it is used in native perfumery.

Food—The leaves are often resorted to to flavour tea and the centre of the stems are cooked in curries.

Medicine—In the Indian Pharmacopœia this oil is regarded as official. When pure it is of a pale sherry colour transparent with an extremely pungent taste and a peculiar fragrant lemon like odour. The properties attributed to it are stimulant, carminative, antispasmodic and diaphoretic. Locally applied it is a rubefacient. It is recommended to be administered in flatulent and spasmodic affections of the bowels and in gastric irritability. In cholera it has been spoken highly of as a remedy of great value allaying and arresting the vomiting and aiding the process of reaction. Dr Waring in the appendix to the Indian Pharmacopœia, records a high testimony in its favour both as an external application in rheumatism and in other painful affections and as a stimulant and diaphoretic internally. He states that amongst the Indo Britons of South India it is one of their most highly esteemed remedies in cholera. Dr Ross in the same notice reports very favourably of a warm infusion prepared by macerating about four ounces of the leaves in a pint of hot water. This he has used very successfully as a diaphoretic in febrile affections especially in weakly subjects or when the fever is of a typhoid type. (*Pharm Ind* 464)

It seems probable that in different parts of India the various species of grass oil are used indiscriminately indeed considerable doubt in many cases exists as to the correct species to which the facts contained in the writings of Indian authors should be referred. Externally they are nearly all used in rheumatism and are administered internally as carminatives in colic and an infusion of the leaves is a popular diaphoretic stimulant and antiperiodic very frequently given in simple catarrh. An infusion of it as a fever drink has great effect in inducing a remission or intermission by bringing on sweat. (*Dals and Gibs Bomb Fl*)

§ **Special Opinions**— Infusion of the leaves (tea) is largely used as an agreeable sudorific in mild cases of fever and as a medicinal vapour bath for the same purpose. It is often combined with *Mentha arvensis* when used with the above object. (*Assistant Surgeon Sakharām Arjun Ravat Bombay*) 'Taken internally in some parts of India in the form of an infusion like tea or with milk it is said to be a stimulant and diaphoretic. The vapour of a hot infusion is inhaled by fever patients to produce diaphoresis' (*Surgeon W Barren Bhuj Cutch Bombay*) An infusion of the leaves (known as 'Lemon tea') is very refreshing. (*Honorary Surgeon P Kinsley Chicacole Ganjam, Madras*) 'The roots and tender leaves are sometimes given with black pepper in cases of disordered menstruation and in the congestive and neuralgic forms of dysmenorrhœa. The oil is useful in flatulent colic and other spasmodic affections of the bowels and as an application in chronic rheumatism &c' (*Brigade Surgeon J H Thornton B A M B, Monghyr*) Carminative and tonic to the intestinal mucus membrane, useful in vomiting and diarrhœa externally it forms a useful liniment" (*Surgeon Major Henry David Cook, Malabar*) 'Lemon grass oil, applied with prolonged friction is a pleasant and useful application in lumbago" (*H DeTatham*)

PERFUMERY
Verbena oil
1081
Otto of Lemon
Grass
1082
Soaps and
Greases
1083

FOOD
Leaves
1084
Stems
1085

MEDICINE
Oil
1086

Infusion.
1087

Roots and
leaves
1088

Liniment.
1089

A. 1089

DROPOGON
laniger

The *Juncus Odoratus*.

M D M R C P Lond Ahmednagar) ' It is used as a stomachic for children and also as a diaphoretic Externally it is used for ringworm (*Surgeon H W Hill Manbhum*) The oil is used to conceal the odour of iodoform in the Dispensary of the Royal Infirmary, Edinburgh ' (*Dr Forsyth Dinajpore*)

1090 Andropogon contortus, Linn

THE SPEAR GRASS

Vern—*Sarwāla sarāla sarāri* Pb *Parba parbi parva bandar pnu cha sarwar musel lap* N W P *Panri pullu* TAM *Eddi eddi gaddi* TEL

Habitat.—Grows on pasture grounds a very troublesome weed, reduced to *Heteropogon contortus*, R & S which see

1091 A. Hookeri, Munro

Habitat.—A native of the Panjáb (at Pathankote) altitude 1500 feet (*C B Clarke*)

1092 A. Ischaemum, Linn

Syn—*A. ANGUSTIFOLIUM Sibth & Sm*

Vern—*Palwal jarga* N W P

Habitat—Grows (at Aligarh) on barren wet soil and is eaten by cattle and horses ' (*Lang*) Excellent for hay the seeds are nutritious This is considered (at Muttra) one of the best fodder grasses. (*Crooke Duthie's List of Grasses 20*)

1093 A. laniger, Desf

THE *JUNCUS ODORATUS* and *HERBA SCHÖENANTHI* of Pharmacists

Syn—*A. IWARANCUSA Roxb (in part) CYMBOPOGON LANIGER Ders*
A OLIVIERI Boiss

Vern—*Lamjak bur khawr or khawr khor panni solara san ibharanku sha karan kusha ghat-yari* HIND and Pb *Karankusa ibharankusha* BENG *Miriya ban ganguli bad piriya* N W P *Lamajjaka* SANS *Iskhir* ARAB and BOMB

The *Makhsan ul Adwiyā* describes two forms of the plant called *Iskhir* and gives their synonyms from which it would appear that under the first form it confuses *A. Schoenanthus* and *A. laniger* as one The second form is apparently *A. muricatus*, the *khas khas* of India Compare with note under the last species

Habitat—Native of the Lower Himālayan tract (said to occur in Thibet at an altitude of 11000 feet), extending through the plains of the North West Provinces and Panjáb to Sind An inhabitant of dry desert tracts

History—It is particularly mentioned by *Arrian* in his account of Alexander's journey through the Panjáb and Sind and was gathered by the Phœnician followers of the army in Lus who called it spikenard It is common about Kurrachee and is used as a scent by the natives (*Dals & Gibs Bomb Fl 302, under A. Iwarancusa, Roxb*) This plant has a wide distribution, extending from North Africa through Arabia and North India to Thibet it is the *σχόινος ἀρωματικός* of *Dioscorides*, and the *Herba Schoenanthi* and *Juncus odoratus* of Latin writers on *Materia Medica* It has also been named *Fœnum camelorum* from its use as a forage for camels The Arabic name *Iskhir* is given

The Khus-khus

ANDROPOGON
muricatus.

in the best lexicons as derived from the root *دحر*, the same root furnishes the derivative *Zakhrāh* a common term in India for stored up forage &c Western India is supplied from the Persian Gulf ports (*Dymock Mat Med W Ind* 691) Mr Tolbort has sent us specimens under the name of *Khavi* gathered by himself in 1869 between Multan and Kot Sultan and quite agreeing with the drug of pharmacy" (*Fluck and Hanb Pharm* 728)

Medicine—Used to purify the blood and in coughs chronic rheumatism and cholera It is recommended as a valuable aromatic tonic in dyspepsia especially that of children it is also used as a stimulant and diaphoretic both by natives and Europeans in gout rheumatism and fever (*Baden Powell*) The grass has an aromatic, pungent taste which is retained in very old specimens We are not aware that it is distilled for essential oil (*Fluck and Hanb Pharmacog* 728) U O Dutt says of this species Its virtues seem to reside in the larger roots marked with annular cicatrices

Fodder—*Roxburgh* says it grows in large tufts each tuft composed of a number of plants adhering together by their roots The roots are aromatic Cattle are said to be very fond of the grass The plant has been called *Fænum camelorum* from its use in dry desert tracts as a forage for camels

§ A jungle grass does not grow about cultivation Is grazed when tender but not when full grown may be stacked and is then useful in times of scarcity will last 10-12 years in stack When cattle eat much of this grass the milk becomes scented' (*Mr Coldstream Commissioner Hissar*)

MEDICINE
1094FODDER
1095**Andropogon milaceus, Roxb**

THE HILL GRASS

Syn—A MILIFORMIS *Stend*

Habitat—An erect grass from 6 to 10 feet in height inhabiting the mountains north of Oudh

Roxburgh writes The seeds of this most beautiful stately grass were sent me from Lucknow by the late Gen Claude Martin under the name of Hill Grass It blossoms during the latter part of the rains

1096

A muricatus, Retz

CUSCUS KHUS KHUS or KOOSA

Syn—A SQUAROSUS *Linn* VETIVERIA ODORATA *Virey* ANATHERUM MURICATUM *Retz* RHAPHIS MURICATA *Nees* PHALARIS ZIZANOIDES *Linn*

Vern—(The plant) *Khas bena panni senth ganrar onei balah*, or *bala hind Panni* PB *Bale ka ghans* DUK (the root) *Khas-khas shanadér jhar vala balá* (the root) BENG HIND and DUK *Srom SANTAL Tin OUDH Valo Guj Váld MAR Váld khasakhasa BOMB Vala CUTCH Vetti-vér vishalvér ilamich chamvér víranam TAM Vatti-véru avvuru gaddi-véru lamay-jakamu-véru vidavali-véru ouru-véru TEL Lavanchá KAN Vetti-vér ramachcham-vér MAL Usira vir ana SANS Usir ARAB Khas PERS Savandra-múl SINGH Miya móe BURM*

According to *Moodeen Sheriff*, the lowest parts of the culms of this grass with or without a portion of its roots are sold under the Arab name *Iskhir* in South India while in Haidarabad, Calcutta &c, *Iskhir* is used for *A Schoenanthus* The true *Iskhir* of Arabia does not according to him, exist in India He seems also to regard the name *khas-khas* as being

1097

A. 1097

DROPOGON
auriculatus.

The Khus-khus.

doubtfully a true Bengal synonym It is the name by which the roots are universally known in Bengal and there seems no possible chance of confusing them with *khas khas* the poppy seed **Dr Dymock** (*Mat Med, W Ind*) gives *Iskhar* as the Arab and Bombay name for **A laniger**, which see

Habitat—A perennial tufted grass very common in every part of the coast (Coromandel Mysore) and in Bengal and Burma where it meets with a low moist rich soil especially on the banks of water courses &c (*Roxb*) It covers large tracts of waste land in Cuttack It inhabits the plains of the Panjab and North West Provinces and ascends into Kumaon 1 000 to 2 000 feet in altitude (*Duthie*) Cultivated in Rajputana and Chutia Nagpur (Gobindpur) This plant is alluded to on some copper plate inscriptions discovered near Etawah (dated A D 1103 and 1174) as being one of the articles on which the kings of Kanauj levied imports (*Proc As Soc Beng Aug 1873 p 161*)

Resin—The roots contain a resin and volatile oil which is rather difficult to extract (*Dr Bidie's Paris Exhibition Catalogue, p 47*)

Fibre—The roots are extensively made into aromatic scented mats hung over doors and kept wet to cool the atmosphere during the hot season and are also in great demand for making fans ornamental baskets and other small articles &c The grass is suited for the manufacture of paper and it is estimated that from 60 000 to 70 000 maunds are annually available in the Hissar district of the Panjab alone In the *Gazetteer of the Central Provinces* the grass is described as a nuisance to the cultivators as it grows on the rich soils and is very difficult to eradicate

Mr Baden Powell says the fibre is much used as a packing material

Oil—The roots when distilled with water yield a fragrant oil which is used as a perfume and as such it deserves the extended attention of European perfumers **Dr Irvine** in his *Medical Topography of Ajmere* mentions the preparation of attar from the roots of this plant which he says is used in sherbet

Medicine—An infusion of the roots is given as a febrifuge and a powder in bilious complaints *Khas khas* is regarded as stimulant diaphoretic stomachic and refrigerant The essence (or otto) is used as a tonic The roots are regarded as a cooling medicine and are given mixed with other medicines having similar properties A paste of the pulverised roots in water is also used as a cooling external application in fevers

The *Pharmacopœia of India* says of this plant 'Antispasmodic diaphoretic diuretic and emmenagogue properties have been assigned to it but beyond being a gentle stimulant diaphoretic it seems to have no just claims to notice as a medicine An account of the uses to which it has been put in Europe is given by **Pereira** (*Mat Med Vol II Pt I p 132*) Its uses in native medicine are detailed in the *Taleef Shereef p 14 No 47* According to the analysis of **Gager**, it contains a resin a bitter extractive and a volatile oil The dose of the powdered root is about twenty grains or it may be given in infusion (two drachms of the bruised root to ten ounces of boiling water) in doses of an ounce or more As a medicine as far as is at present known it is an article of minor importance' **U O Dutt** says It is described as cooling refrigerant, stomachic and useful in pyrexia, thirst inflammation irritability of the stomach, &c It enters into the composition of several cooling medicines, as, for example the preparations called *Shadanga pānya* A weak infusion of the root is sometimes used as a febrifuge drink Externally it is used in a variety of ways A paste of the root is rubbed on the skin to remove oppressive heat or burning of the body The use of this drug appears to have been popular with the ancients "An aromatic cooling bath is prepared by adding to a tub of water the following substances in

RESIN
1008
FIBRE
1099

OIL
Perfumery
1100

MEDICINE
Roots
1101

The Citronella.

ANDROPOGON
Nardus.

fine powder namely root of *Andropogon muricatus*, *Pavonia odorata* (bala) red sandal wood and a fragrant wood called *padma kashtha* (*Hindu Mat Med* 271)

Chemical Composition — *Khas khas* has been analysed by *Vanquillin* who has obtained from it 1st a resinous substance of a deep red brown colour having an acrid taste and an odour like myrrh 2nd a colouring matter soluble in water 3rd a free acid 4th a salt of lime 5th a considerable quantity of oxide of iron 6th a large quantity of woody matter (*Vanquillin Annales de Chimie t LXXII p 302*) (*Dymock's Mat Med W Ind* 692)

§ The grass with its roots is boiled in water and used as a steam bath in fevers of a continued type producing speedy and profuse diaphoresis. The otto is given in two minim doses to check the vomiting of cholera (*Surgeon Major F M Honston Travandrum*)

Used in the form of cigarettes with benzoin it relieves headache a cold infusion is refrigerant (*Surgeon Major John Lancaster Chittore*)

Infusion of the root is used as a febrifuge (*Surgeon Major F F L Ratton Salem*)

Refrigerant (*Surgeon C M Russell Sarun*)

Fodder — The grass when young affords good fodder. After the rains are over it is cut as bedding for horses at Saharanpur

§ Principally used for thatching not grazed upon except in times of excessive drought. Cattle will eat the young leaves after the stems have been burned down (*Mr Coldstream Commissioner Hissar*)

Domestic Uses — *Tin* a grass in universal use for thatching purposes the reeds being made into brooms. The roots of it supply the *khas* with which our hot weather tatties are made. It grows on the banks of rivers and marshes and is generally strictly preserved as it takes time to spread. Proprietors are averse to its being dug up for the *khas* (*Oudh Gasetteer III 176*). The fibre is made into fans ornamental work boxes and other small objects

FODDER

II02

DOMESTIC

Thatching

grass.

II03

Tatties

II04

Fans.

II05

Boxes

II06

II07

Andropogon Nardus, Linn

THE CITRONELLA

Syn — *A FLEXUOSUS* Nees *A COLORATUS* Nees *A MARTINI* Thw (*En Ceylon Plants 361 not of others*), *A IWARANCUSA* Roxb (*in part*) *CYMOPOGON FLEXUOSUS* Nees *C NARDUS* Linn (*in Pharm Ind*)

Vern — *Ganjni* or *ganjini ká-ghás pust burn* HIND *Kamá khér* BENG *Ganjni* DUK *Usadhan* MAR *Kamakshi pullu* *mandap-pullu* *kavattam-pullu* *shunnárip-pullu* TAM *Kamakshi kasuvu* *kámanchi gaddi*, TEL *Kamakshi pulla* *chóra pulla* MALA *Ganda-hanchi khaddi* KAN *Maana* SINGH *Sing-ou mia* BURM

Habitat — A grass common in the plains and lower hills of the North West Provinces and Panjáb extensively cultivated in Ceylon and Singapore for the production of oil of citronella. Abundant about Travancore. As cultivated in Ceylon it often rises to the height of 6 or 8 feet. It is most readily recognised from all the other species by its rufous colour short spikes and narrow leaves

Oil — The leaves are distilled with water, and yield over 3 ozs of essential oil from 1 cwt. The pure oil is thin and colourless, with a strong aromatic odour and an acrid, citron like flavour

The average exportation of citronella from Colombo is about 40 000 lbs, valued at £8 000 valued at about 4s 1d per lb. It is largely used to give the peculiar flavour to what is known as Honey soap.

The extract published below giving a mode of detection of admixture of other oils with citronella, taken from the *Year-Book of Pharmacy for*

OIL

II08

A. II08

**NDROPOGON
Nardus****The Citronella.**

1875 will be found useful since doubtless the same process would be applicable to all the grass oils. It may be remarked however that the author is incorrect in attributing citronella to *A. Schoenanthus*, but the adulteration of the Indian *rusa* oil (the oil from *A. Schoenanthus*) is daily becoming more and more serious and an easy mode of detecting the adulterations is thus very important. This same mistake is made by Dr Wright (*Year Book of Pharm.* 1874 631) who gives some interesting chemical information regarding citronella oil which he appears to regard as obtained from *A. Schoenanthus*.

Chemical Composition—Dr Wright informs us that the essential oil of citronella mainly consists of an oxidized substance boiling near 210° which becomes to a certain extent resinized losing partially the elements of water, by continued heat. On analysis it gave quantities which would agree with the formula $C_{10}H_{18}O$ a formula corroborated by its behaviour with bromine zinc chloride &c. Prof Gladstone who experimented with citronella oil some time previous to Dr Wright (1872) arrived at the conclusion that it owed its peculiar property to an oxidised oil which he called *Citronellol*. This he separated by fractional distillation into two portions the one boiling at $200-205^{\circ}C$ and the other at $199-202^{\circ}C$. The composition of each portion as arrived at by Gladstone would be represented by the formula $C_{10}H_{16}O$.

The chemistry of Citronella oil would thus seem to require further investigation to remove the slight disparity in these opinions.

II09

Estimation of Fixed Oil in adulterated Citronelle (*Chem News* XXX 203)—The following method yields constant results when managed with care and when taken in conjunction with the specific gravity of the sample may give a good approximation as to the quantity and the class of the adulterating oil—

(a) Dissolve about one ounce of caustic potash in five ounces of alcohol in a flask put on a sand bath and leave to boil.

(b) Take an eight ounce beaker and weigh into it 400 to 500 grains of the citronella add two volumes of alcohol boil on a sand bath.

(c) When (a) and (b) are both boiling add one volume of the alcoholic solution of potash to the three volumes alcohol and citronella. Boil for a minute or so and then fill to within an inch of the top with distilled water. Stir gently and let boil for half an hour or until the upper layer is perfectly clear and the under fluid semi transparent. Then allow to cool.

(d) When quite cold siphon off the under fluid [containing water alcohol potash and soap if any fixed oil was in the sample] very carefully into another beaker and boil gently. Acidify with dilute H_2SO_4 . Add 50 or 100 grains of wax continue gently boiling till the oily layer is perfectly clear and then allow to cool gradually.

(e) When cold remove the cake of fat dry and weigh. The weight less 50 or 100 grains of wax is the amount of fatty acid contained in the fixed oil. A simple calculation will show the amount per cent of the adulterant in the citronella. (*Year Book of Pharmacy* 1875 p 302)

III0

Cultivation of the grass and distillation of Citronella Oil—In Ceylon the citronella grass is raised from seed and planted like guinea grass and will give two or three crops a year. When fit to cut the grass is carried to a large boiler and the oil is distilled. It is estimated to give about three dozen bottles of oil to the acre but the demand is limited and price fluctuates from 2s 6d to 4s 6d a bottle. At the latter price it pays handsomely while at the former it little more than covers expenditure. A still, capable of turning out a dozen bottles a day, costs £300 (*Report by Major Wimberley Officiating Deputy Superintendent, Port Blair, from the Tropical Agriculturist* Vol III p 58).

A. III0

Geranium Grass

ANDROPOGON
Schoenanthus

Citronella Grass-stuff as a Paper Fibre—A correspondent, writing in the *Ceylon Observer* suggested the use of citronella grass as paper material. In extracting oil from the grass it is boiled or subjected to steam under pressure and as this is one of the first operations to which the raw material is subjected in paper manufacture grass which has been thus treated should be much more easily utilised than material not previously boiled. Citronella grass like esparto can be supplied entirely free from knots which is a great advantage in paper manufacture. At present about 3 500 tons of citronella are available for export in Ceylon (*Tropical Agriculturist Vol III p 831*)

Medicine—This is regarded as officinal by the Indian Pharmacopœia the essential oil of citronella used medicinally being imported from Ceylon. In its properties it closely approaches that from *A. citratus*

Dr Irvine in his *Materia Medica of Patna* says that the infusion of the leaves in doses of $\frac{1}{4}$ to 2 ounces is used as a stomachic

Domestic Uses—**Dr Trimen** writes me that this grass is in Ceylon largely used for thatching

FIBRE
III1MEDICINE
OIL
III2
Infusion
III3**Andropogon pertusus, Willd**

Syn—*A. punctatus* Roxb. *Holcus pertusus* Linn. *A. annulatus*, Forsk. *Lepeocercis pertusus* Hassk.

Vern—*Pulwal* puluah rukar N W P *Palwan* or *palwa minyar* PB

Habitat—Found on old pasture grounds generally shaded by trees in the plains of the Panjab and North West Provinces and at lower elevations of the Himalaya. Abundant in Hissar

Fodder—**Dr Stewart** writing under *A. annulatus* Forsk. says It is considered excellent fodder for bullocks &c. and for horses when green. In Australia it is regarded as one of the best grasses to withstand long droughts while it will bear any amount of feeding (*Baron Von Mueller*)

§ Good for stacking will remain for 12 or 13 years much stacked at the Hissar farm. Is especially grazed by buffaloes (*Mr Cold stream Commissioner Hissar*)

III4

FODDER
III5**A. scandens, Roxb**

Habitat—Found in the Panjab in Kashmfr and Bundelkhand. It is a coarse grass growing commonly in hedges. It flowers during the rains

Fodder—Cattle are apparently not fond of it

FODDER
III6
III7**A. Schoenanthus, Linn Royle, Ill. Him., t 97**

THE GERANIUM GRASS, RUSA OIL GRASS, OIL OF GINGER GRASS

Syn—*A. Martini* Roxb. *A. Naedoides* Nees. *A. Calamus Aromaticus* Royle. *A. Pachnodes* Trin. *Cymbopogon Martini* Munro

Vern—*Rusa ghas* rousá-ghás rousa kughás musel mirchia gand. **HIND** *Agya ghás gandha bena* **BENG** *Bujina pála-khari* N W P **Rajns** PB *Mirchia gard* **SIWALIKS** *Rosegavat rohisha* **BOMB** **MAR** *Rusa-ka tel roshel* (the oil)

In **Moodeen Sheriff's** Supplement to the Pharmacopœia of India the vernacular names for the Lemon grass are given under *A. Schoenanthus* instead of *A. citratus*

Habitat—This grass is wild in Central India, the North West Provinces and the Panjab. **Dr Roxburgh** first saw the plant from seeds forwarded to him by **General Martin**, collected in Balaghat during the last war with Tippu Sultan. This is the rousa paper grass abundant everywhere in the Deccan

A. III7

**DROPOGON
hœnanthus.****Geranium Grass.****OIL.
II118**

Oil—The oil obtained from this plant has come to bear a number of names which appear for the most part to be of modern origin and to indicate the use to which it is put. Perhaps the name by which it is most generally known is *rusa oil* *roshel* (*rusa ka tel*). As pointed out by the distinguished authors of the *Pharmacographia* these names look exceedingly like a corruption from rose oil the more so since the principal consumption is as an adulterant for attar of roses. It is curious however that as stated by Dr Dymock (*Mat Med W Ind* 690) the Indian distillers and dealers know nothing of this use. About 40 000 lbs are annually exported from Bombay to the Red Sea ports chiefly to Jedda a small amount finds its way to Europe but the great bulk is sent to European Turkey. In Arabia and Turkey it appears under the name of *idris yaghi* and in the attar producing districts of the Balkan it is known at least to Europeans as geranium oil or Palmarosa oil. The name Geranium oil which has caused much confusion with the true geranium oil or oil from the geranium plant has apparently come into existence from the fact that the so-called geranium grass oil is used to adulterate the true geranium oil which in its turn is used as an adulterant for attar of roses. Piesse says that true geranium oil is worth 3s an ounce whereas geranium grass oil is not worth more than that sum per lb.

The *Pharmacographia* gives some interesting information regarding the mode by which *rusa* oil is refined so as to prepare it for admixture with the attar of roses. The *rusa* oil is shaken with water acidulated with lemon juice and then exposed to the sun and air. By this process it loses its penetrating after smell and acquires a pale straw colour. The optical and chemical differences between grass oil thus refined and attar of roses are slight and do not indicate a small admixture of the former. If grass oil is added largely to attar it will prevent its congealing (*p* 728). It was formerly added to the attar only in Constantinople but now the mixing takes place at the seat of the manufacture. It is said that in many places the roses are sprinkled with it before being placed in the still. As grass oil does not solidify by cold its admixture with rose oil renders the latter less disposed to crystallize (*p* 267). The degree of admixture with grass oil is thus determined by the crystallizing of the attar.

From the fact of one of the largest supplies of Indian grass or *rusa* oil being in Nimar district Khândesh Bombay Presidency the oil has come to bear the commercial name of Nimar (or as it is commercially written Namar) oil. Dr Dymock gives some interesting information regarding this industry. The first mention apparently of the oil is by Maxwell in 1825 (*in the Calcutta Med Phys Trans Vol I p* 367). It was afterwards described by Forsyth 1827 (*Ibid Vol III p* 213). It is only within comparatively recent times that the oil has become an article of commercial value. Dr Dymock thus describes its manufacture. It is now chiefly distilled in the Nimar district an iron still being used and a very small quantity of water when the still is carelessly worked the grass burns and communicates a dark colour to the oil which should be of a pale sherry colour. I am assured by the Bombay dealers that all the oil of commerce is more or less adulterated a comparison of the commercial article with some oil distilled by myself supports this statement the adulteration is said to be practised by the distillers who, I am informed are regularly supplied with oil of turpentine from Bombay. The grass flowers in October and November, and is then fit for cutting. 373 lbs of grass received from Khândesh, and submitted to distillation under my own superintendence in Bombay yielded 1 lb 5½ ozs of oil. It appears that the chief substances used to adulterate the Khândesh *rusa* oil are turpentine, ground nut, rape and

A. II118

Geranium Grass

ANDROPOGON
Schœnanthus.

linseed oils With the two first the turbidity passes off in a day or two hence they are preferred and turpentine is chiefly used, because it cannot be detected by the evaporation test Dr Dymock adds The genuine oil is dextrogyre the ray is rotated 39 to the right by 100 min 200 min rotate it 78 Some samples of the commercial article rotate the ray about 13 to the right some have little or no effect upon it

Medicine—The oil is used as a liniment in chronic rheumatism and neuralgia and is believed to have the property of curing baldness It resembles in quality and appearance the lemon grass oil The oil is seldom taken internally by the natives, but is considered a powerful stimulant when applied externally

Ainslie calls **A. Nardus** (?) ginger grass or spice grass and says that an infusion of it is used as a stomachic and that occasionally an essential oil is prepared from it which is useful in rheumatism but the plant he refers to is probably **A. Schœnanthus** Similar confusion exists in the writings of most Indian authors § There is a grass about Bombay which smells like fresh ginger I think it must have been introduced as it is only found about fields and gardens (*Surgeon Major W Dymock*) It seems probable this is Ainslie's plant which may prove a distinct species from **A. Schœnanthus**

The *Bombay Gazetteer* gives an interesting account of the manner in which *rosa* oil used to be prepared at the Panch Mahals Paper soap and grass oil were formerly prepared but these industries have almost entirely disappeared The grass oil made from the large bladed aromatic grass known as *roisa* which used to grow over large stretches of waste land was at the rate of 4s (Rs) a pound bought in considerable quantities and used partly as a remedy for rheumatism partly to mix with attar of roses The oil was extracted by distillation A rough stone oven was built by the side of a stream and in it a large metal caldron was placed and filled with bundles of grass and water When full a wooden lid was put on and sealed with a plaster of ground pulse *adad* Through a hole in the lid one end of a hollow bamboo was thrust and the other end passed into a smaller metal vessel securely fixed under water in the bed of the stream The oven was then heated and the vapour passing through the hollow bamboo was by the coldness of the smaller vessel precipitated as oil (*Bombay Gazetteer* III 251)

Mr Baden Powell appears to be referring to this plant under **Cymbopogon aromaticus** (Vern—*Khas usar balam*) He says Considered by natives cool and astringent useful in skin diseases bilious affections and special diseases It is an aromatic stimulant useful in fever and to make *tatties* The roots are dug up in March and April Used as an aromatic in fever Gives a fragrant oil (*Panjab Products Vol I 383*) This quotation might as far as its facts are concerned be equally applicable to **A. muricatus**, but since in another part of his work Mr Baden Powell alludes to the *khas khas* under its correct botanical synonym and the more so since **A. Schœnanthus** is a native of the Panjab it seems a just inference that by **Cymbopogon aromaticus** is meant **A. Schœnanthus** If this be correct the above vernacular names become of interest as those in use in the Panjab for this species Dr Stewart describes two species as common in the plains of the Panjab, but he gives their characters and vernacular names jointly and it is therefore impossible to separate them The scientific names which he gives to these Panjab forms are equally confusing—**Cymbopogon Iwarancusa**, *Schult* and **C. laniger** *Desf* Regarding the latter there seems little or no doubt it is **Andropogon laniger**, *Desf* the species which in habits the dry sandy and desert tracts of the Panjab Sind &c. The former seems to be **A. Schœnanthus**, *Linn*, which by Stewart has been

MEDICINE
Oil
III9

A. III9

**ANEILEMA
apiflorum****A Substitute for Siyah Musli**

incorrectly named *Cymbopogon Iwarancusa*, *Schult* The oil which *Stewart* on the authority of *Vigne* says is prepared near Hassan Abdal would according to this view, be a form of rusa or Nimar grass oil *Stewart* adds the exceedingly interesting fact which does not appear to have been observed by other authors A spirit (*arak*) he says is also distilled from the grass with spices &c and is said to be useful in indigestion and fever' *Madden* mentions that the roots are sometimes luminous

§ The decoction of it is a febrifuge and I have used it in cases of cold and feverishness with benefit (*Assistant Surgeon Bolly Chand Sen Calcutta*) 'Excellent external application in rheumatism' (*Assistant Surgeon Nehal Singh Saharunpore*) Mixed with tea in equal proportion and infused is sometimes used as a diaphoretic in fevers' (*Surgeon Major C F McKenna Cawnpore*)

**FODDER
II20**

Fodder—*Duthie* writes The grass is a favourite fodder for cattle and *Mr Miller* tells me that at Banda (North West Provinces) it is grown in meadows kept for the purpose and sold in the bazar

General Martin collected seed of this grass in the high lands of Balaghat while there with the army during the war with Tipu Sultan and after growing it in Lucknow sent specimens to *Dr Roxburgh*, with the remark that he had noticed the cattle were voraciously fond of it but that it had so strong an aromatic and pungent taste that the flesh of the animals fed upon it as also the milk and butter were strongly scented with the plant There seems some mistake in this account of *General Martin* having collected *A Schoenanthus* on high lands it frequents swamps *A lauger, Desf* is found on dry places

§ Not very good for grazing Grows in swamps but not abundant in Hissar A tall grass too coarse to stack but used for thatching and screens. (*Mr Coldstream Commissioner Hissar*)

II21

ANEILEMA, R Br *C B Clarke in DC Monogr Phaner*,
III 195 Gen Pl III 849

A genus of herbaceous perennials belonging to the Natural Order COMME LINACEÆ and the Tribe COMMELINEÆ comprising 60 species chiefly Asiatic and African only 5 or 6 occurring in America In India there are 28 species met with in the plains one or two ascending to 2 500 feet in altitude

Stem erect delicate rarely robust simple or branched *Leaves* scattered or crowded and radical *Peduncles* often terminal or in the axils of the upper leaves simple or branched *Inflorescence* a many flowered panicle with the middle branches the longest or corymbose or few flowered rarely 1 flowered *bracts* few rarely herbaceous and sheathing in a few species they resemble the spatheaceous condition of *Commelina* *Stamens* 6 of which 3 2 are fertile free filaments tapering hairy or glabrous of these 2 are opposite the lateral and interior sepals and have large anthers the cells of which are parallel and united throughout their length 1 opposite the anterior petal generally fertile but with the anthers diverging the other 3 stamens have sterile anthers *Ovary* sessile 3 locular *Seeds* few or solitary arranged in 1 or 2 vertical series

II22

Aneilema scapiflorum, Wight, Ic, t 2073

Syn—*COMMELINA SCAPIFLORA Roxb Fl Ind Ed C B C 59 A TUBER OSUM Buch Ham in Wall., Cat MURDANNIA TUBEROSA Royle Him Ill t 95*

Vern—*Kureli BENG Siyah musli or musli-e siyah, PERS HIND Sismu*
hi Guj

The above (Hindustani) vernacular names are by authors said to be applied to the tubers of this plant, but it would seem that this can only be the case when used as substitutes for the true *Siyah musli*—the roots

A II22

The Anemone.

ANETHUM
Sowa.

of *Curculigo orchioidea*, Gært. it is difficult to discover whether it possesses any properties of its own or not

References—*DeCandolle Monog Phaner* by C B Clarke III 200
Clarke & Commel et Cyrt Beng t 14 *Stewart's Pb Pl* 236

Habitat—A native of the Himálaya from the Jumna to the Khásia Hills Tenasserim and south to Cape Comorin ascending to 1,000 feet in altitude

Botanic Diagnosis—Roots perennial fascicled tuberous fusiform Scape composed of dichotomous elongated pikes branches angled bracts large sheathing or spathaceous often ochreate Petals equal rounded concave blue Stamens 3 perfect with 3 sterile alternating ones filaments all hairy anthers blue Capsule 3 angled ellipsoid apex acute or mucronate Seeds white minutely reticulated and very minutely glandular

Properties and Uses—

Medicine—Said to have astringent and tonic properties and considered by natives to be hot and dry useful in headache giddiness fever jaundice and deafness It is also regarded as an antidote to poisons, and a cure for snake bite

§ The roots of this plant bear no resemblance to the *Siyah Musli* of the bazars (*Surgeon Major Dymock Bombay*) The dried powder mixed with sugar is used as an aphrodisiac With the juice of the *tulsi* leaves it is administered for pains in the kidneys and is one of the chief remedies used by hakims for spermatorrhea (*Surgeon Emerson Calcutta*) Root bark dried in the shade is said to have been employed with benefit in cases of asthma It is a remedy of great repute for impotence and spermatorrhœa It is used also in colic piles and infantile convulsions In combination with *Dárfilfil* it is employed in bites of mad dogs both internally and externally (*Asst Surgeon Gholam Nabi*) It is used for incontinence of urine (*Surgeon Major C W Calthrop Morar*)

ANEMONE, Linn Gen Pl I 4

A genus of perennial herbs belonging to the Natural Order **RANUNCULACEÆ** Leaves radical lobed or divided Flowers occurring in 1 or more flowered simple or branched scapes involucre 3 partite bracts free or connate Petals 0 Stamens many outer deformed or petaloid Carpels many ovule 1 pendulous Fruit a head of sessile achenes with naked or bearded styles

There are some 80 species natives of the cold and temperate regions, of which 15 occur in India

Anemone obtusiloba, Don Fl Br Ind, I, 8

Vern—*Rattanyog padar* Pb

Habitat—Temperate and Alpine Himálaya from Kashmír to Sikkim altitude 9 000 to 15 000 feet

Chemical Composition—Several varieties of Anemone contain a principle *anemone* or *anemone camphor* which is stated to be an acrid poison *Anemonic acid* is also contained in the fresh herbs

Medicine—In Hazara the pounded root which is acrid is mixed with milk and given internally for contusions In Bissahir it is said to be used as a blister, but to be apt to produce sores and scars (*J L Stewart Pb Pl*)

§ 'The seeds (which are as sweet as almonds) if given internally produce vomiting and purging The oil extracted from them is used in rheumatism' (*Bappoojee Foyaram Bhoslay, Funagarh*)

Anethum Sowa, Kurz, and A. graveolens, Linn

See *Peucedanum graveolens, Benth* **UMBELLIFERÆ**

MEDICINE,
Tuberous
Root
II23

II24

II25

MEDICINE
Root,
II26

A. II26

ANISOMELES
malabarica.**The Gao-zubán****1127****ANGELICA**, Linn *Gen Pl*, I, 916**Angelica glauca**, Edgew *Fl Br Ind*, II, 706, **UMBELLIFERÆ****Vern** —Chora or Churd, Pb**Habitat** —From Kashmír to Simla altitude 8,000 to 10 000 feet found also in the Dhanla Dhar Range above the Kangra Valley**MEDICINE****1128****Medicine** —A cordial and stimulant remedy formerly used in the cure of flatulence and dyspepsia It is also used in obstinate constipation, and in bilious complaints**FOOD****1129****Food** —Its aromatic root is added to food to give it a flavour like that of celery**Angustura Bark**, see *Galipea Cusparia*, St Hil **RUTACEÆ****Anise seed**, see *Pimpinella Anisum*, Linn **UMBELLIFERÆ****Anise, Star**, see *Illicium Anisatum*, Linn **MAGNOLIACEÆ****1130****ANISOCHILUS**, Wall *Gen Pl*, II, 1177**Anisochilus carnosus**, Wall *DC Prod XII*, 81 **LABIATÆ****Vern** —*Panjiri ka pat situ ki-panjiri* HIND *Kapurli chora onva kapurli* BOMB MAR *Ajmanu-patru ajam* GUJ *Ayv n ka patta panjiri ka patti* DUK *Karppura valli* TAM *Karpura valli somamu aku roga chettu* TEL *Chomara kattu kurkku kurkku patu kurkku* MAL *Dod da-patri* KAN**Habitat** —Found in the North Circars and Malabar**MEDICINE****Leaves****1131****Medicine** —Ainslie says that the fresh juice of the leaves mixed with sugar candy is given by the Tamil doctors in cynamche and mixed with sugar and gingelly oil is used as a cooling liniment for the head The leaves and stems are given in infusion in coughs and colds as a mild expectorant especially for children The plant yields a volatile oil which is said to be stimulant diaphoretic and expectorant (*Dymock Pharm Ind Bidre Madras Quart Med Journ* 1862)§ The juice of the leaves mixed with sugar and human milk is in Mysore a popular domestic remedy for coughs in children (*Surgeon Major North Bangalore*)Juice used in catarrh (*Surgeon Major J J L Ratton M D, Salem*)**Anisodus luridans**, Linth & Otto, see *Scopolia lurida*, Dunal, **SOLANACEÆ****1132****ANISOMELES**, R Br, *Gen Pl*, II, 1207**Anisomeles malabarica**, R Br *DC Prod, XII*, 456 Wight, *lc*, t 864 **LABIATÆ****Vern** —Chodhara MAR BOMB *Mogbire ka-patté* DUK *Peymarutti péya verutti irattai-péy marutti* TAM *Moga biraku moga-bira maga bira mogbira mabheri china-ranabheri* TEL *Péyi-meratti peruntumba, karintumba* MAL *Butan kushum* SANS§ This plant in Bombay is known as Chodhara (four angled) It is aromatic but is not the *Gule gao subán*, which is mucilaginous" (*Sakháram Arjun Ravat Bombay*)

Dr Birdwood mentions this as one of the plants which in Bombay

A 1132

The Anodendron.

ANODENDRON
paniculatum.

are sold as *gao subán*, but this seems to be a mistake. I have however received that as the name by which it is known in Cutch, the true *gao subán* is imported into India from Persia,—see *Echium*, but doubtless many other plants are sold under that name

Habitat—Found in South India **Dr Dymock** says it is pretty common on the Ghats in the Bombay Presidency but appears to be better known in South India

Medicine— Few plants are held in higher esteem or are more frequently employed in native practice than this. An infusion of the aromatic bitter leaves is in common use in affections of the stomach and bowels catarrhal affections and intermittent fevers. According to **Dr Wight** in addition to its internal use in the cure of fevers patients are made to inhale the vapour of a hot infusion so as to induce copious diaphoresis (*Pharm Ind*) **Ainslie** tells us that an infusion of the leaves is given to children in colic dyspepsia and fever arising from teething. A decoction of the plant or the essential oil distilled from the leaves is used externally in rheumatism (*Dymock*)

§ A handful of the leaves is used in Mysore with a vapour bath when profuse diaphoresis is required' (*Surgeon Major John North Bangalore*) Diaphoretic dose of infusion 1 to 2 oz (*Surgeon W Barren Bhuj Cutch*)

MEDICINE

Leaves.

1133

Infusion

1134

Decoction

1135

Anisomeles ovata, R Br

Vern—*Gobura*

Habitat—Found in Ceylon Coromandel Bombay, Bengal and Nepal

Medicine—The whole plant has a strong camphoraceous smell. In Ceylon a distilled oil is prepared from it and found useful in uterine affections. It has also carminative astringent and tonic properties

MEDICINE.

1137

ANISOPHYLLEA, Brown Gen Pl, I, 683

A genus of trees or shrubs belonging to the Natural Order RHIZOPHOREÆ

Leaves alternate ex stipulate *Flowers* minute in axillary simple or fascicled spikes ebracteate or minutely bracteolate bi or uni sexual *Petals* 4 small involute *Stamens* 8 *filaments* short subulate *anthers* small didymous *Ovary* inferior 4-celled *styles* 4 *Embryo* exalbuminous

Anisophyllea zeylanica, Benth Fl Br Ind, II 442

Vern—*Wellipyanne* SINGH

Habitat—A tree of the southern and central parts of Ceylon, ascending to 1500 feet

Structure of the Wood—Greyish brown moderately hard

1139

TIMBER.

1140

1141

ANODENDRON, A DC Gen Pl, II, 719

Anodendron paniculatum, A DC Fl Br Ind, III, 668, APOCYNACEÆ

Vern—*Dul* SINGH

Habitat.—An immense climber occurring from Sylhet to Martaban the Deccan Peninsula Western Ghats from the Konkan southward, Ceylon altitude from the plains up to 2,000 feet

Fibre.—The stem yields a fine and very strong fibre, much used by the Singhalese (*Thwastes Trimen*)

FIBRE

1142

A. 1142

ANOGEISSUS
latifolia**The Anogeissus****1143****ANÆCTOCHILUS, Bl Gen Pl, III 598****Anæctochilus setaceus, Blume; Wight, Ic, t 1731; ORCHIDÆ****Vern** — *Wanna-rajah* (vulg) SINGH**Habitat** — Damp forests of Ceylon**MEDICINE****1144****Medicine** — Dr Trimen informs me that this is considered a valuable medicine in Ceylon**1145****ANOGEISSUS, Wall Gen Pl I 687**

A genus of trees or shrubs belonging to the Natural Order COMBRETACEÆ comprising some 4 or 5 species natives of Africa and India

Leaves alternate or falsely opposite petioled entire *Flowers* in dense globose heads on axillary peduncles much shorter than the leaves *Calyx* tube long attenuated above the ovary sub-persistent with 5 deciduous lobes *Petals* wanting *Stamens* 10 in two series and without glands or stamens at their base (the character of the tribe COMBRETÆ as distinguished from GYROCARPÆ) *Ovary* inferior 1-celled *style* filiform simple *ovules* pendulous from the top of the cell *Fruits* small coriaceous compressed 2 winged packed horizontally into dense heads *Seed* 1**1146****Anogeissus acuminata, Wall, Fl Br Ind II, 450, Bedd, Fl Syl, t 16****Syn.** — CONOCARPUS ACUMINATA Roxb Fl Ind Ed C B C 384**Vern** — *Chakwa* BENG *Gara hesel pandri pansi* KOL *Panchi pasi* URIYA *Numma* TAM *Pachi manu panchman paunchinan bucha karum* TEL *Phas* or *phas* MAR *Saikamehha thekri napay* MAGH *Yung sehoong* ARACAN *Yungben yon* BURM**Habitat** — A large deciduous tree met with in some districts of Bengal Orissa South India Chittagong and Burma**Botanic Diagnosis** — *Leaves* elliptic or oblong acute at both ends villous or pubescent beneath peduncles solitary (rarely clustered) very rarely divided ripe fruits shining glabrous

There are two distinct varieties of this plant —

Var 1st typica — Leaves broad lanceolate fulvous beneath peduncles with obovate bracts often large and leaf like fruit broadly winged with a deflexed pubescent beak much longer than the nucleus**Habitat** — Northern edge of the Deccan ascending to altitude 3000 feet Bundelkhand the Circars Godáveri and North West India**Var 2nd lanceolata** — Leaves narrow lanceolate grey beneath bracteoles on the peduncles small linear very deciduous fruit winged, sub quadrate with an erect beak shorter than the nucleus**Habitat** — Pegu Tenasserim*Properties and Uses* —**Tan** — The leaves are used in Gamsur for tanning (*Gamble*)**Structure of the Wood** — Grey sometimes yellowish grey with a greenish tinge shining in structure moderately hard resembling that of *Anogeissus latifolia* It warps and cracks in seasoning and is not very durable especially where exposed to water Weight 57 lbs per cubic foot

Used in Burma and in Madras for building Roxburgh says it is durable if kept dry but soon decays if exposed to wet

TAN
Leaves
1147
TIMBER
1148**1149****Anogeissus latifolia, Wall Fl Br Ind, II, 450, Wight, Ic, t 994, Bedd, Fl Syl, t 15****Syn.** — CONOCARPUS LATIFOLIA Roxb Fl Ind Ed C B C 384**Vern.** — *Dhaurá, dhaurá dhauri dhau dhanta, doku bakla bakli* HIND**A 1149**

The Anogeissus.

ANOGEISSUS
latifolia.

Gôlra goldia dhaukra, dhokri dau RAJ ; *Dhauk ULWAR Dhdura*
 C P *Khardhawa BANDA Vellay naga namme vekali, TAM*
Chirmanu sherman or siri manu yettama, tirman yella maddi TEL
Dham OUDH Dohu dhobu URIYA Hesel KOL and SANTAL Dhau
MAL (S P) Dabria dhavdo GUJ ; Dhamoru dhavda MAR Dhava
DUK Dinduga dindiga dindlu bejalu dindal KAN ; Arma yerma
GOND Dhawa BAIGAO Dhaundak BHIL Dhaura KURKU Daawu
 SINGH

Habitat—A large handsome tree met with in the Sub-Himálayan tract from the Rávi eastward ascending to 3000 feet in Central and South India Very plentiful in Melghát common in the Upper Godávari not met with in the trans Gangetic Peninsula

Botanic Diagnosis—*Leaves* broad elliptic obtuse at both ends ; peduncles 1 or more from the same axil often branched bracteoles inconspicuous ripe fruits shining glabrous, the beak as long as the nucleus or longer

Properties and Uses—

Gum—It yields a gum which is extensively sold for use in calico-printing It occurs in clear straw coloured elongated tears adhering into masses sometimes honey coloured or even brown from impurities As an adhesive gum it is inferior in strength to gum arabic in consequence of which it commands a much lower price in Europe the more so since it is nearly always mixed with the bark of the tree sand and other impurities and adulterated with the brown tears which are probably derived from some other plant than *Anogeissus* In India the reputation of this gum stands high with the calico printers especially of Lucknow and it probably possesses some specific peculiarity justifying this preference since it is used with certain dye stuffs such as with *haldi* (*Curcuma longa*), while gum arabic or *babul* is used with *madder* (*Rubia cordifolia*) The *Dhava* or *bakli* gum is generally collected in April

According to the Rev A Campbell Pachumba the gum of this tree is used by the Santals in the treatment of cholera It is much eaten by the people in Ghána, and in the Central Provinces it is regarded as more adhesive than *babul* gum (See *Gazetteers*)

Dye and Tan—In addition to the gum being used by calico-printers Dr Dymock informs me that the leaves are in Bombay used as a tan They were analysed by Dr Lyon and were found to contain as much tannin as those of the *Sumach* tree The leaves yield a black dye and are very useful in tanning (*Bomb Gaz XIII Part I 24*) Mr Duthie reports that they are also used as a tan in the N W Provinces

Structure of the Wood—Grey hard shining smooth with a small purplish brown irregularly shaped extremely hard heartwood Sapwood in young trees and branches yellow Annual rings marked by darker lines Weight about 65 lbs per cubic foot

It is highly valued on account of its great strength and toughness but it splits in seasoning and unless kept dry is not very durable It is used for axe-handles poles for carrying loads cart axles in the construction of furniture agricultural implements and in ship-building It has been recommended for sleepers Out of 18 sleepers which had lain seven to eight years on the Mysore State Railway there were found when taken up four good ten still serviceable and four bad It gives an excellent charcoal A very valuable firewood it is strong and tough and much used for cart axles poles and in calico-printing *The Bombay Gazetteer* (III p 199) says that although it does not rank as a timber tree it makes good fuel and is used for ploughs in the Panch Maháls Gujarát In the Deccan it is regarded as one of the commonest and most useful of trees.

GUM
II50

DYE & TAN.
Leaves
II51

TIMBER.
II52

ANONA
reticulata.**The Bullock's Heart****1153****Anogeissus pendula**, *Edgew Fl Br Ind, II 451***Syn**—*CONOCARPUS MYRTIFOLIA* Wall**Vern**—*Dhau dhaukra kala dhaukra* MEYWAR The lesser dhauk
ULWAR Kardahi HIND**Habitat**—A small gregarious tree with pendulous branches found in the arid and northern dry zones of Rajputana Malwa plateau as far as the Nerbudda in Nimar and in the Mandla District**Botanic Diagnosis**—*Leaves* small elliptic or obovate acute or obtuse always narrowed at the base peduncles solitary simple fruit subquadrate ultimately glabrous beak much less than half the height of the nucleus**TIMBER****1154****Structure of the Wood**—Hard yellowish white with a small irregular blackish purple heartwood Weight 59 lbs per cubic foot
It coppices well but the wood is not in general use**1155****ANONA**, *Linn Gen Pl I 27*

A genus of trees or shrubs belonging to the Natural Order ANONACEÆ comprising some 50 species inhabitants of America and Africa a few being naturalised in Asia Three species are met with in India of which two may be described as naturalised

Flowers solitary or fascicled terminal or leaf-opposed *Sepals* 3 small valvate *Petals* 3-6 valvate 2 seriate the inner series sometimes wanting outer triquetrous base concave *Stamens* numerous anther-cells narrow dorsal contiguous top of connective ovoid *Ovaries* many subconnate style oblong ovule 1 erect *Ripe carpels* confluent into a many-celled ovoid or globose many seeded fruitThe word Anona is said to be derived from the Malay name *Manoa* pronounced in Banda Islands *Menona* Some authorities derive the word from *Annona* Lat the year's produce or grain *annus* a year It is difficult to see what could have suggested the name if this derivation of the word be correct**FOOD**
Fruit
1156**Anona Cherimolia**, *Miller* A native of America and of Jamaica and the other West Indian Islands nearly allied to *A squamosa*, is regarded by the Creoles as the most delicious fruit in the world—an opinion not generally confirmed**A. muricata**, *Linn, DC Prod I, 84***THE SOUR SOP****FOOD**
Fruit
1157

The fruit of this tree is sometimes to be seen in India for although not so common as either of the following species it is occasionally seen in cultivation It often attains a weight of upwards of two pounds It is greenish and covered with prickles the pulp is white and has an agreeable slightly acid flavour Drury says this species is sparingly cultivated in Madras the fruit is muricated with soft prickles

1158**A. reticulata**, *Linn, Fl Br Ind, I, 78***THE BULLOCK'S HEART, OR TRUE CUSTARD APPLE of the West Indies****Vern**—*Lound ram-phal* HIND *Nóna* BENG *Góm SANTAL Ramphal*
BOMB DUK MAR GUJ KAN *Rámsta* or *rámstú-plam* TAM
Rámá-pandu rámá-phalam or *rámá-chandar-pandu*, TEL**Habitat**—A small tree supposed by some authors to be a native of Asia naturalised in some parts of India extensively cultivated occurring everywhere in Bengal, Burma, and South India.**A 1158**

The Custard Apple

ANONA
squamosa

Dye—The dry unripe fruit yields a black dye, and the fresh leaves a fairly good quality of indigo

Tan—§ The leaves and young twigs are largely used for tanning”
(*E A Fraser Rajputana*)

Fibre—A good fibre is prepared from the bark of the young twigs

Food—The fruit which resembles a bullock's heart ripens during the latter part of the rainy season and is eaten by natives but only rarely by Europeans

Medicine—The bark is said to be a powerful astringent and to be much used as a tonic by the Malays and Chinese. The fruit is reported to be used in the West Indies and by the natives of America as an anti-dysenteric and vermifuge

Timber—Very little has been written regarding the timber obtained from this small tree. Skinner gives 40 lbs as the weight per cubic foot

Anona squamosa, Linn Fl Br Ind I 78 Roxb, Fl Ind, Ed C B C 453

CUSTARD APPLE of Europeans in India, SWEET SOP or SUGAR APPLE of the West Indies and America

Vern—*Sharifah* at or *átá sitáphal* or *sítáfal* HIND DUK GUJ MAR, ARAB *Sharifa behli* N W P *Áta luna* BENG *Áta kátdl* ASS *Mandar góm* SANTAL *Sírpha áttá* MAL *Sita palam* or *sita-pásham* TAM *Sitapandu* TEL *Átta* CINGH *Ausa* or *awsa* BURM The fruit is called *Sharifah* and *Kaj* in PERSIAN

Habitat—A small tree naturalised in Bengal and the North West Provinces. It is common in Rajputana (*Raj Gaz* p 27). Abundant in many places in Burma but principally at Prome where the neighbouring hills are covered with orchards of this fruit (*British Burma Gaz Vol I 430*). Cultivated as far north as Gurdaspur in the Panjab. Almost wild in the Central Provinces and Bundelkhand (near old forts) and in swamps near Burmdeo in the Kumaon Bhábar (*Brandis*). Grows wild in the Deccan up to Sholapore. In Sind it is also cultivated but the fruit is inferior (*Murray*). (rows in a semi wild condition in Kaira and in the Panch Mahals Bombay (*Gazetteer*))

HISTORY—Custard apples have been identified among the sculptures of the Ajanta caves as well as of the Bhárhut Stupa. This identification is opposed to the theory that the custard apple is an introduced tree. On this subject General Cunningham remarks: My identification of this fruit amongst the Máthura sculptures has been contested on the ground that the tree was introduced into India by the Portuguese. I do not dispute the fact that the Portuguese brought the custard into India as I am aware that the East India Company imported hundreds of grindstones into the fort of Chunár as if to illustrate the proverb about carrying coals to Newcastle. I have now travelled over a great part of India and I have found such extensive and such widely distant tracts covered with the wild custard apple that I cannot help suspecting the tree to be indigenous. I can now appeal to one of the Bhárhut sculptures for a very exact representation of the fruit and leaves of the custard apple (*Bharhut Stupa 55*). The names of the two varieties of custard apple *Ramphal* and *Sítáphal* are in themselves almost enough to show that from very early times the trees have been grown and honoured by the Hindus (*Bomb Gaz, XII 490*)

Botanical evidence is opposed to General Cunningham's opinion on this subject indeed there seems hardly any doubt as to *Anona squamosa*, Linn, being an introduced plant (see account given under ANONACEÆ) the date of its introduction is, however, very obscure. *Anona reticulata*,

DYE
Fruit
1150
TAN
Leaves.
1160
FIBRE
1161
FOOD
Fruit.
1162
MEDICINE
Bark
1163
Fruit
1164
TIMBER
1165

1166

1167

**ANONA
squamosa****The Custard Apple****HISTORY**

Linn is wild in Cuba Jamaica and the West Indies and together with **A. squamosa**, has been naturalized in India. It is impossible however to point to any forest where either species shows the slightest indication of being indigenous. The representations referred to by **General Ounningham** might be associated with a large number of plants they may prove to be conventional representations of the jack fruit tree or some other allied plant they are not unlike the flower heads of the sacred *kadamba* or *Anthocephalus*. It may be remarked that the Bengali names *nona* and *ata* are as much opposed to the custard apple tree being indigenous to India as are the names referred to by **General Ounningham** in favour of that idea. We know that the natives of India have adopted pre existing names for introduced plants (an indefinite series of examples of this might easily be produced) and there is no evidence to show that this is not the case with the vernacular names now given to the custard apple. (See *Argemone*)

Properties and Uses—

Fibre—An inferior quality of fibre may be prepared from this species

Medicine—The RIPE FRUIT is medicinally considered a maturant and when bruised and mixed with salt is applied to malignant tumours to hasten suppuration. The SEEDS LEAVES and immature fruits contain an acid principle fatal to insects and the dried UNRIPE FRUIT powdered and mixed with gram flour is used to destroy vermin. An infusion of the leaves is considered efficacious in prolapsus ani of children. The root is regarded as a drastic purgative natives administer it in acute dysentery. It is also employed internally in depression of spirits and spinal diseases.

§ The *Makhzan* notices the poisonous action of the seed upon lice and says that when applied to the os uteri they cause abortion. (*Surgeon Major Dymock*). The leaves are applied for the extraction of guinea worm in Secunderabad. (*Surgeon Major John North Bangalore*)

Green leaves pounded and made into a paste and without admixture of water are applied to unhealthy ulcers. (*Surgeon Anund Chunder Mukerji Noakhally*). Leaf used for anthelmintic. (*Surgeon Major C M Russell Sarun*). The leaves pounded with tobacco leaves and a little quicklime are frequently used by the natives in ill conditioned ulcers to destroy maggots in the inferior animals. (*Honorary Surgeon Easton Alfred Morris Negapatam*). The leaves are applied to sores infested with maggots. (*Brigade Surgeon G A Watson Allahabad*)

Fruit good for digestion. (*Surgeon Major J J L Ratton M D Salem*). The seeds are used to destroy lice. The bark is employed internally in depression of spirits in asthma and fever. (*Surgeon W Barren Bhuj Cutch*). The fresh leaves made into a pulp are applied to abscesses to hasten suppuration. (*Surgeon Major C J W Meadows Burrisal*)

Chemical Composition—The seeds yield an oil and resin the latter appears to be the acrid principle. (*Dymock Mat Med W Ind 18*)

Fruit—The plant may be described as completely domesticated in Indian gardens. The fruit ripens in summer is of a more delicate flavour than the fruit of *A. reticulata*, and is eaten with relish by both natives and Europeans. The opinion formed of this fruit in India is much more favourable than in the West Indies a fact which would seem to indicate that it is much superior in quality in India than in the country where it is supposed to be indigenous. In the West Indies an agreeable fermented drink, like cider is made from the expressed juice. In India the juice is chiefly used to flavour ice-puddings. The fruit has, in times of famine, literally proved the staff of life to the natives of some parts of India. Its extended cultivation should be encouraged.

A. 1176**FIBRE****1168****MEDICINE****Ripe fruit****1169****Seed & leaves****1170****Unripe fruit****1171****Infusion****1172****Root****1173****FOOD****Fruit****1174****Juice****1175****Beverage****1176**

The Anonaceæ

ANONACEÆ

Structure of the Wood—Soft close grained Weight 46 lb per cubic foot

TIMBER.
II77
II78

ANONACEÆ

A Natural Order of shrubby or arborescent Thalamiflorals comprising some 400 species inhabiting the tropical moist regions of Asia, America and Africa rare in the extra tropical zones and almost absent from dry regions. They extend over the whole world for about 40° on each side of the equator in Africa to about 20° north latitude. None are indigenous to Europe. In India there are in all 192 species grouped into 26 genera of which 109 are referred to the following genera: 19 species in *Uvaria*, 18 in *Unona*, 25 in *Polyalthia*, 17 in *Goniothalamus*, 16 in *Melodorum* and 14 in *Xylopia*. Of the whole Indian species only 14 or 7.3 per cent ascend above the level of the plains. The large majority are confined to the warm moist plains and lower hills of the eastern side of India extending to the Straits *vis* 124 species or 64.5 per cent. South India including Ceylon naturally stands next in importance containing 43 species or 22.4 per cent. 16 are met with in the Western Peninsula, or 8.3 per cent while 9 occur chiefly in cultivation over the greater part of India. None are met with however as endemic to the dry tracts of India such as Sind Rájputana Central India or the Panjáb and except as stunted plants under garden cultivation they do not exist even in these regions. This remarkable isolation in the type vegetation of the eastern and southern from the western and northern divisions of India is borne out by many other Natural Orders suggesting forcibly a strong resemblance to the moist tropical regions of America. Not only in the tropical and extra tropical regions is this idea borne out but also in the assemblages of temperate and even alpine plants which occur on the mountain tracts of the eastern division of India. Sir J. D. Hooker in his *Himalayan Journals* (Vol II 39) says "At first sight it appears incredible that such a limited area (Lachen valley Sikkim) buried in the depths of the Himálaya should present nearly all the types of the flora of the north temperate zone. After enumerating the trees which are common to Europe and North America which occur also in the Lachen valley Sir Joseph Hooker adds "Of North American genera not found in Europe were *Buddleia*, *Podophyllum*, *Magnolia*, *Sassafras*? *Tetranthera*, *Hydrangea*, *Diclytra*, *Aralia*, *Panax*, *Symplocos*, *Trillium*, and *Clitonia*. The absence of heaths is equally a feature of the flora of North America."

This idea of the similarity of the flora of the eastern division of India to many of the features of the new world has a remarkable confirmation in the distribution of the species belonging to the Magnoliaceous genus *ILICUM* the Star Anise. Commencing in China and Japan they extend through the Straits to the mountains of northern Mánipur and the Khásia Hills and passing almost round the globe they re appear again in the basin of the Mississippi. The ease with which tropical American plants become naturalised in India until they almost appear as indigenous to the Gangetic plains must largely depend on the causes which have given birth to the similarities indicated. No better example of this could possibly be given than the distribution of the species of *Anona* now met with in India. The pine apple has also in eastern India and the Straits become a troublesome weed. *Anona* belongs to the series *Duguetia*, *Rollinia*, *Cymbopetalum*, *Bocagea* and *Anona*, a group of genera characteristic of the eastern side of America from the United States to the south of Brazil, only 1 or 2 species of *Anona* are supposed to be indigenous to Africa or occur outside the region indicated. Dr Martius (*Fl Bras Anonac* 51) in his history of the Anonas is of opinion that the cultivated species are

A II78

ANONACEÆ.**Analysis of the Anonaceæ**

natives of the Antilles from whence they were introduced into South America and the Old World. According to DeCandolle the custard apple is a native of the West Indies no *Anonaceæ* with a united ovary occurring in Asia (See account of *Anona squamosa*.)

For a definition of the Natural Order ANONACEÆ the reader is referred to the *Flora of British India* (Vol I 45) where will also be found the following analysis of the genera —

Tribe I Uvarieæ — *Petals* 2 seriate one or both series imbricate in bud *Stamens* many close packed their anther cells concealed by the overlapping connectives *Ovaries* indefinite

Flowers 1 sexual ovules many torus conical 1 **Stelechocarpus**

Flowers 2 sexual ovules many rarely few torus almost flat 2 **Uvaria**

Flowers 1 2 sexual ovule solitary 3 **Elpeia**

Tribe II Unoneæ — *Petals* valvate or open in bud spreading in flower flat or concave at the base only inner subsimilar or 0 *Stamens* many close packed their anther cells concealed by the overlapping connectives *Ovaries* indefinite

* *Petals conniving at the concave base and covering the stamens and ovaries*

Ovaries 1 3 many ovuled peduncles not hooked 4 **Cyathocalyx**

Ovaries many 2 ovuled peduncles hooked 5 **Artabotrys**

Ovaries many ovules 4 or more peduncles straight 6 **Drepananthus**

** *Petals flat spreading from the base*

Ripe carpels indehiscent

Ovules many 2 seriate petals lanceolate 7 **Cananga**

Ovules many 2 seriate petals broad ovate 8 **Cyathostemma**

Ovules 2 6 1 seriate on the ventral suture 9 **Unona**

Ovules 1 2 basal or sub basal 10 **Polyalthia**

Ripe carpels follicular 11 **Anaxagorea**

*** *Inner petals valvate tip incurved*

12 **Popowia**

Tribe III Mitrephoreæ — *Petals* valvate in bud outer spreading inner dissimilar concave connivent arching over the stamens and pistil *Stamens* many close packed anther cells concealed by the overlapping connectives *Ovaries* indefinite

Inner petals not clawed

Inner petals smaller than the outer

13 **Oxymitra**

Inner petals much larger than the outer

14 **Phæanthus**

* *Inner petals clawed, usually smaller than the outer*

Ovules 1 2 near the base of the ovary

15 **Goniothalamus**

Ovules many

16 **Mitrephora**

Tribe IV Xylopleæ — *Petals* valvate in bud thick and rigid connivent inner similar but smaller rarely 0 *Stamens* many close packed anther-cells concealed by the produced connectives *Ovaries* indefinite

Ovules solitary fruit fleshy of many connate carpels

16 ***Anona**

Ovules 2—many outer petals broad torus convex 17 **Melodorum**

Ovules 2—many outer petals narrow torus flat or concave

18 **Xylopia**

Tribe V Miliuseæ — *Petals* imbricate or valvate in bud *Stamens* often definite, loosely imbricate anther-cells not concealed by the overlapping connectives *Ovaries* solitary or indefinite

Properties and Economic Value of the Anonaceæ

ANONACEÆ.

* *Ovaries indefinite*

| | | |
|---|----|---------------------|
| Petals valvate inner largest ovules definite | 19 | <i>Milnesa</i> |
| Petals valvate, inner largest ovules indefinite | 20 | <i>Saccopetalum</i> |
| Petals valvate subequal ovules 4 8 | 21 | <i>Alphonsea</i> . |
| Petals valvate inner shortest ovules 2 4 | 22 | <i>Orophea</i> |
| Petals imbricate subequal ovules 2 8 | 23 | <i>Bocagea</i> |

** *Ovaries solitary*

| | | |
|--------------------------------------|----|---------------------|
| Outer petals valvate inner imbricate | 24 | <i>Kingstonia</i> |
| All the petals valvate | 25 | <i>Lonchomera</i> " |

(Fl Br Ind, I, 46)

Affinities in Structure of the Anonaceæ—They resemble the Myrsinaceæ in the 3 partite valvate perianth extrorse anthers solitary erect unatropous ovule copious ruminate albumen minute basilar embryo with inferior radicle woody aromatic stem and alternate more or less distichous leaves folded lengthwise in bud They are separated by the fact that the Anonaceæ have usually hermaphrodite flowers petaloid with indefinite stamens and generally numerous carpels with exarillate or only imperfectly arillate seeds The ternary arrangement of the parts of the flower bring them also very near to the Menispermaceæ and to the Magnoliaceæ From the former they differ in habit size of the flower the inflorescence the structure of the stamens and the fruit from the latter by the leaves being stipulate the testa of the seed fleshy and the albumen not ruminate They also approach very near to the Dilleniaceæ but in the latter the leaves are often stipulate the flowers terminal and quinary and the albumen not ruminate

1179

Properties and Economic value of the Order—The bark is usually aromatic stimulant and astringent the inner layer affording a useful bast fibre The leaves also possess the aromatic properties of the bark being often acid and sometimes even nauseous The non aromatic fruits are generally edible The flowers are sometimes strongly perfumed some species being used in European perfumery such as the Ilang ilang (*Cananga odorata*) which is also used in India to perfume coconut oil and by rubbing over the skin to bring back the heat of the body in the cold stage of fever The species of *Xylopia* are most useful *X. æthiopica* supplied the ancients with the so-called Ethiopian pepper The wood of the species of *Xylopia* is exceedingly bitter and from the Brazilian species strong ropes are made from the bark

1180

The fruit of some of the American *Uvarias* is edible *U triloba* affording the Papaw of the United States from which an alcoholic drink is prepared Other species are used as stimulant drugs Blume has shown that the barks of certain species are efficacious in affections arising from obstruction of the portal vein but they require to be used with caution

The leaves of *Artabotrys suaveolens* afford an aromatic medicine said to be efficacious in inducing reaction during the cold stage of cholera The flowers of *Artabotrys odoratissima* are used in native perfumery while the roots of *Polyalthia macrophylla* are strongly aromatic an infusion in Java being used in eruptive fevers Many species of *Anona* yield edible fruits The timber is often extremely light as for example in the genus *Polyalthia*, such as the lance-wood a timber extensively used by coach builders *Polyalthia longifolia* is valued in India as an avenue tree, because of the rapidity of its growth and the dense mass of graceful undulated leaves, in spring this tree produces a flush of pale delicate green leaves, becoming at this season one of the most elegant of Indian roadside trees

A. 1180

ANTHEMIS
nobilis**The Common Chamomile****ANT-GREASE****GREASE**
1181
OIL
1182

Ant grease is prepared by boiling white-ants and skimming off the oil which floats on the surface. An oily substance is also obtained by expression. Ant grease is reported to be an article of food.
§ 'Red ants are eaten by the Santals (Rev A Campbell)

1183**ANTHEMIS, Linn Gen Pl, II, 420**

A genus of annual or perennial COMPOSITÆ belonging to the Tribe ANTHEMIDEÆ and comprising some 80 species chiefly inhabitants of the temperate regions of Europe, Asia and Africa.

Heads radiant receptacle convex or conical scaly throughout. *Flowers* of the ray female or neuter ligulate in one row. *flowers of the disk* perfect tubular. *Bracts of the involucre* of few rows. *Fruit* terete or bluntly tetragonal without pappus but with a more or less prominent margin.

1184**Anthemis nobilis, Linn DC Prod VI 11****COMMON OR TRUE CHAMOMILE**

Vern—The flowers *Babuni-phul* *babune ké phul* or *babunah* HIND DUK *Shimai chamantipu* TAM *Sima chāmanti-pushpam* or *sima chamanti-puruu* TEL *Shima-jevanti pushpam* MAL *Shime shyamantige chamundi huovu* KAN *Babunaj* ARAB *Bābunah guile* *babunah* PERS The *Anthemis* of **Dioscorides**

Dr Dymock says The Persian name *Babuna* has said to be derived from the name of a village in Irak Arabi this the Arabians convert into *Babunaj*

References—*Ind Pharm* 121 *Fluck and Hanb Pharmacop* (1879) 384 *Medical Plants by Bentley and Trimen* 154 *U S Dispens* 15th Ed 195 *Dymock's Mat Med W Ind* 370

Habitat—A perennial herb indigenous in England but is also plentiful in France Spain Germany and Russia Imported into India and also cultivated in the gardens of the rich

Chemical Composition—§ The flowers yield about 15 per cent of essential oil first of a pale blue colour becoming yellowish brown in the course of a few months. The researches of **Demarcay** show this oil to be a mixture of butylic and amylic angelate acid and valerate. A bitter crystalline acid has been isolated from double chamomile which is regarded as identical with anthemis acid from **Anthemis arvensis**. According to **Flückiger** and **Hanbury** the bitter acid principle is apparently a glucoside they also state that no alkaloidal principle is contained in the flowers. According to **Bley** the seeds contain a bitter substance which appears to be an alkaloid (Surgeon C F H Warden Professor of Chemistry Calcutta)

According to **Kopp** (*Liebig's Annalen CXCV 81 92*) the oil saponified by boiling with alcoholic potash and after fractional distillation was found to contain angelic ($C_8H_8O_2$) and tiglic ($C_8H_8O_2$) acids in about equal proportions isobutyric acid in much smaller amounts and a fourth acid most probably methacrylic. He also confirms the statement made by **Demarcay** that by gentle heat angelic acid is transformed into isomeric tiglic acid.

Medicine—The medicinal properties of this imported drug are too well known to require a detailed account in a work on the Economic Products of India. The dried flower heads are officinal in the *Indian Pharmacopœia*. They are described as stimulant, tonic and carminative, and useful in constitutional debility hysteria and dyspepsia. Formerly they were employed in intermittent fevers, but this usage has been superseded

MEDICINE
Flower-
heads
1185**A. 1185**

The Anthocephalus

ANTHOCEPHALUS

by the introduction of cinchona. In large doses they act as emetic. Bags containing hot moist chamomile flower heads are sometimes used externally on account of their retention of heat. Chamomile oil possesses stimulant and antispasmodic properties and is considered a valuable remedy for flatulence. Persian chamomile is obtained from *Matricaria Chamomilla*, Linn (*M. suaveolens* Linn) which see.

§ Flower tops by boiling in hot water are used by natives as an external application and fomentation in rheumatic and other painful affections. (Assistant Surgeon Bhagwan Das Rawal Pindi.)

I have found a warm infusion of dried chamomile flower heads a most soothing application in cases of conjunctival irritation a poppy capsule or two is a useful addition. (Surgeon Joseph Parker Poona.)

Substitutes and Adulterations—In Europe the following plants are chiefly used for this purpose *Matricaria Parthenium* Linn *Matricaria parthenoides* Desf *M. Chamomilla* Linn. The single chamomile flowers are said to yield more oil than the double. (*Bent & Trim Med Pl*)

Anthemis Pyrethrum, Linn, see **Anacyclus Pyrethrum**, DC, COMPOSITÆ

ANTHISTIRIA, Linn Gen Pl III, 1136

A genus of grasses belonging to the Tribe ANDROPOGONEÆ GRAMINEÆ

Anthistiria arundinacea, Roxb Fl Ind Ed C B C, 84

Vern—*Bharua askhun* PANJABI NAMES (according to Duthie) *Ullah kangar khandura*, N W P (Atkinson)

Habitat—A grass met with chiefly in the North West Provinces

Fibre—The culms yield a fibre used for cordage and for the sacrificial strings used by the Hindus where *Saccharum Munja* is not available. The leaves are also used for thatching.

A. ciliata, Linn f

THE KANGAROO GRASS of Australia

Syn—ANTHISTIRIA CILIATA Linn and A SCANDENS Roxb as in Fl Ind Ed C B C 83

Vern—*Musel*

Habitat—A widely spread grass stretching through Africa and South Asia to Australia. In India it is reported at Banda, Saharanpore, Garhwāl and Kumaon ascending to 7 000 feet in altitude.

Fodder—This is one of the most useful fodder grasses in India and its cultivation should be extended. In Australia it is much valued being one of the chief grasses upon which Australian cattle are fed. It luxuriates in a warm temperate or tropical climate.

A. polystachia, Roxb Fl Ind I 248

Fodder—Grass given as fodder

ANTHOCEPHALUS, A Rich, Gen Pl, II 29

A genus of glabrous trees comprising 3 or 4 species belonging to the Natural Order RUBIACEÆ one of which occurs wild or cultivated throughout the greater part of the plains of India.

Leaves petioled *stipules* lanceolate caducous. **Flowers** in terminal globose heads without bracteoles, united by their confluent calyx tubes. **Corolla** funnel-shaped **Stigma** simple **Ovaries** confluent 2-celled with a solitary ovule in each cell.

1186

FIBRE
1187

1188

FODDER.
1189FODDER
1190

1191

A 1191

**ANTIARIS
toxicaria****The Poisonous Upas****1192****Anthocephalus Cadamba, Blh & Hook f Fl Br Ind, III 23**

Syn —NAUCLEA CADAMBA Roxb, *Fl Ind Ed C B C* 1723 *Bed dome t* 35 SARCOCEPHALUS CADAMBA Kurz II 63

Vern —Kadam kadamb HIND Kadam BENG Bol kadam CHITTA GONG Sanko KôL Pandur LEPCHA Kodum MECI Roghu ASS Kadambo URIYA Kadamba nhyu BOMB Kadam kadamb nhw MAR Kalam nhw or nhu PANCH MAHALS Kadamb GUJ Vellat cadamba TAM Kadamba rudraksha kamba TEL Heltega arsa natega MYSORE Kaada varlu kadaga kadwal KAN Kadamba nipa SANS Kadamba SINGH Ma u sanyepang MAGH Mau maukadun BURM

Habitat —A large deciduous tree wild in Northern and Eastern Bengal Pegu and the Western Coast cultivated in Northern India

It grows very fast During the first two or three years the rate is about 10 feet a year the girth increasing at the rate of 1 inch a month After 10 or 12 years however the growth becomes very slow (*Ind For X 246*) It grows to a large size in the forest of the Panch Mahals Bombay

Medicine —The bark is used medicinally as a febrifuge and tonic

§ Decoction of the leaves is used as a gargle in cases of aphthæ and stomatitis (*Assistant Surgeon Anund Chunder Mukerji Noakhally*)

Food & Fodder —The fruit is eaten and the foliage sometimes used as fodder for cattle

Structure of the Wood —White with a yellowish tinge soft even grained Weight about 40 lbs per cubic foot

It is used for building in Assam Cachar and occasionally in Darjiling for tea boxes *Cunningham* (1854) says that it is used for beams and rafters on account of its cheapness and lightness and that it is good for joiner's work but is a brittle wood If a little less heavy it would be much valued for gun stocks (*Bomb Gaz XI 24*)

Domestic Uses —The flowers are offered at Hindu shrines they are sacred to *Siva* Often cultivated for ornament and for the grateful shade its large close foliage affords (*Brandis*)

MEDICINE

Bark

1193

Leaves

1194

FOOD

Fruit.

1195**TIMBER****1196****DOMESTIC**

Flowers

1197**1198****ANTIARIS, Lesch Gen 1 III 371**

A small genus of trees containing 5 or 6 species belonging to the Natural Order URTICACEÆ and the Tribe ARTOCARPEÆ

Leaves elliptic oblong rough on short petioles sap milky leaves distichous *stipules* in pairs axillary *Flower heads* axillary clustered monœcious the males crowded within an imbricated involucre opening into a convex receptacle female flowers solitary within a many bracteated involucre and devoid of a perianth *Male perianth* segments and stamina 4 rarely 3 segments spatulate and imbricate with the stamens placed opposite *Ovary* connate to the involucre with a solitary pendulous ovule *style* short 2 cleft the *stigma* filiform recurved *Fruit* a fleshy purple drupe the pericarp formed of the enlarged fleshy involucre *Seed* pendulous *testa* leathery *albumen* wanting

1199**Antiaris innoxia, Bl Syn A SACCIDORA Dalz**

THE TRAVANCORE SACKING TREE

1200**A. toxicaria, Lesch Wight, Ic, t 1958**

THE UPAS TREE

According to some authors, these are kept up as distinct species and by others reduced to one The former occurs in Burma and the Indian Archipelago, and the latter on the Western Ghâts and in Ceylon

Vern. —Chândla chand kudd charvâr mâdâ harvat or kharvat BOMB. MAR, Karwat KONKAN Ali: nettâvî nettâvî maram TAM, Jâsâgrî

A 1200

or Sacking Tree

ANTIARIS
toxicaria

Ajjanapatte jaguri KAN | *Araya angely nettavil* MALA Rsti SINGH
Hmyaseik (formerly *Myeh seik*) BURM

References—*Brandis For Fl* 427 *Kurz Fl Burm II*, 462 *Gamble Man Timb* 332 *A SACCIDORA Dals in Hook Jour Bot III* 232 and *Dals and Gib s Fl Bombay* 244 *Dymock's Mat Med W Ind* 615 *U S Dispens 15th Ed* 1772 *Drury's U s Pl* 45 *Treasury of Botany Smith's Economic Dict*

Habitat—A large evergreen tree of Burma the Western Ghâts and Ceylon § The Upas tree of Java grows all along the eastern slopes of Pegu Yoma Martaban and down to Tenasserim (J C Hardinge *Rangoon*) **Beddome** says it is the largest tree of the western forests attaining a height of 250 feet

History—The most absurd accounts of the properties of this tree have become current While it cannot by any means be regarded as harmless (the juice forming a deadly arrow poison) still it has been freed from the superstitious ideas which lingered around its very name The following extract from the *Treasury of Botany* will be found both interesting and instructive The Upas tree when pierced exudes a milky juice which contains an acrid virulent poison called *antiarin* Most exaggerated statements respecting this plant were circulated by a Dutch surgeon about the close of the last century The tree was described as growing in a desert tract with no other plant near it for the distance of 10 or 12 miles Criminals condemned to die were offered the chance of life if they would go to the Upas tree and collect some of the poison They were furnished with proper directions and armed with due precaution but not more than two out of every twenty ever returned The Dutch surgeon **Foersch** states that he had derived his information from some of those who had been lucky enough to escape albeit the ground around was strewn with the bones of their predecessors and such was the virulence of the poison that there are no fish in the waters nor has any rat mouse or any other vermin been seen there and when any birds fly so near this tree that the effluvia reaches them they fall a sacrifice to the effects of the poison Out of a population of 1 600 persons who were compelled on account of civil dissensions to reside within 12 or 14 miles of the tree not more than three hundred remained in less than two months **Foersch** states that he conversed with some of the survivors and proceeds to give an account of some experiments that he witnessed with the gum of this tree these experiments consisting principally in the execution of several women by direction of the Emperor! Now as specimens of this tree are cultivated in botanic gardens, the tree cannot have such virulent properties as it was stated to have moreover it is now known to grow in woods with other trees and birds and lizards have been observed on its branches It occasionally grows in certain low valleys in Java rendered unwholesome by an escape of carbonic acid gas from crevices in the ground and which is given off in such abundance as to be fatal to animals that approach too closely These pestiferous valleys are connected with the numerous volcanoes in the island The craters of some of these emit according to **Reinwardt** sulphureous vapours in such abundance as to cause the death of great numbers of tigers birds and insects while the rivers and lakes are in some cases so charged with sulphuric acid that no fish can live in them So that doubtless the Upas-tree has had to bear the opprobrium really due to the volcanoes and their products not that the Upas is by any means innocent for severe effects have been felt by those who have climbed the tree for the purpose of bringing down the branches and flowers The inner bark of the young trees which is fabricated into a coarse garment excites the most horrible itching It clings to the

HISTORY
1201

A. 1201

**ANTIARIS
toxicaria.****The Poisonous Upas or Sacking Tree.**

skin if exposed to the wet before being properly prepared. The dried juice mixed with other ingredients forms a most venomous poison in which the natives dip their arrows.

**RESIN
I202**

Resin—It exudes a white resin used for poisoning arrows. On cutting the stem or unripe fruit a white milky viscid fluid exudes in large quantities which shortly hardens becoming of a black and shining colour. This inspissated sap is probably the so-called resin of authors (*Br Burm Gas I 135*).

**FIBRE
I203**

Fibre—The natives strip the bark of this tree into large pieces soak them in water and beat them well when a good white fibre is obtained—a natural cloth worn by the natives. It is in Western India well known as the *sacking tree* on account of the tough inner fibrous felted bark being removed entire thus forming natural sacks. Small branches are made into legs of trousers and arms of coats the larger ones forming the bodies of the garments. In this way felt costumes are made which require no more sewing than is necessary to connect the parts together. If passed through rollers and at the same time dyed and tanned these natural cloths or felts are very interesting. The samples exhibited at the late Calcutta International Exhibition (contributed by the Bombay Committee) were very much admired and proved very attractive. In making sacks sometimes a disk of the wood is left attached to the fibre so as to form the bottom of the sack. At other times a vertical incision is made on the tree and a transverse cut around the stem at the top and bottom of this vertical one. The bark is then peeled off and after being beaten in water and dried the top and bottom are sewed up (forming the sides of the sack). These sacks are extensively used for storing rice. In Ceylon ropes are made of the bark. The bark yields strong fibre suited for cordage matting and sacking. In making sacks a branch or trunk is cut to the required length soaked in water and beaten till the fibre separates from the wood. It is then turned inside out and the wood sawn off except a small piece at the bottom (*Bombay Gasetteer XV Part 1 62 Konkan District*). There seems every likelihood that the bark of this tree may come into use as a paper fibre.

**natural Felts
I204****Sacks
I205
Ropes.
I206
Paper
material
I207****MEDICINE
Seeds
I208**

Medicine—The bitter seeds contain a peculiar principle which may prove an active medicinal agent. Information regarding the properties of these seeds would be desirable (*Pharm Ind*).

§ 'The seeds are used as a febrifuge and in dysentery dose $\frac{1}{2}$ to $\frac{1}{4}$ seed three times a day' (*Surgeon Major W Dymock Bombay*).

I209**CHEMICAL COMPOSITION**

"**Upas Antiar and Upas Tieute**—Under these names two poisons have long been used by the natives of Java and other East India islands for poisoning their arrow heads and very exaggerated notions have prevailed among the people of the Western World in relation to the tremendously destructive power over animal life of the Upas tree in Java from which it was supposed that the poison was derived. The tale was told that birds and animals perished when within the influence of its exhalations and that man came into its near vicinity at the peril of life. All such accounts have proved to be fabulous but there is no doubt as to the exceedingly poisonous character of the arrow poison to which reference has been made. It seems now to be pretty well determined that the active ingredient of the *Upas Antiar* is a gum resinous exudation proceeding from incisions in the trunk of the *Antiaris toxicaria*, a large tree belonging to the *URTICACEÆ* growing in Java, Celebes, and the neighbouring islands and described in *Lindley's Flora Medica* (p 301). Like certain species of *Rhus*, this plant exhales an æriform matter which

The Antidesma.

ANTIDESMA
Bunias.

CHEMISTRY

very unpleasantly affects many of those who approach it, causing eruptions upon the skin and exterior swelling while others seem altogether insensible to its influence. The juice is mixed with various substances, which probably have little other effect than to give a due consistence to the poison. This whether taken internally or introduced into the system through a wound acts with extreme violence producing vomiting with great prostration a feeble irregular pulse involuntary evacuations and convulsive movements which are soon followed by death which Brodie ascertained to be due to cardiac paralysis. From a chemical examination by Pelletier and Oaventou it appears that the Antiar owes its activity to a peculiar principle *antiarin* crystallizable soluble in water and alcohol but scarcely so in ether and consisting of carbon hydrogen, and oxygen $C_{14}H_{20}O_5$ (see *A J P* 1863 p 474). *Antiarin* appears to act directly as a paralyzant on the cardiac muscle diminishes the irritability of the peripheral vagus and stimulates the vaso motor centres (*N R*, 1875 p 308).

[§ I failed to obtain *antiarin* from the seeds of this plant they contain a bitter principle (*Surgeon Major W Dymock Bombay*)]

The *upas tieute* is even more poisonous than the *antiar*. This is said to be obtained from a climbing woody plant growing exclusively in Java and belonging to the genus *STRYCHNOS* especially designated by Leschenault as *Strychnos Tieute*. It is from the bark of the root according to this author that the poison is prepared. A decoction of the bark is concentrated to the consistence of syrup then mixed with onions garlic pepper &c and allowed to stand till it becomes clear. Leschenault, having dipped the point of an arrow in the poison and allowed it to dry pricked a chicken with it which died in a minute or two in violent convulsions. MM Delille and Magendie found that the poison had not lost its strength in four years (*Hammond Am Journ of Med Sci* 1860 p 366). Three grains have produced very violent symptoms resembling those caused by strychnine which alkaloid has indeed been found in the poison (*Chemist and Druggist May 15 1863*).

Dr Wm A Hammond made some experiment with a poisonous substance brought by Dr Ruschenberger from Singapore which proved to have the combined effects of the two poisons above mentioned both diminishing directly the power of the heart and causing tetanic spasms of the muscles suggesting that it might be a mixture of the antiar and tieute but Dr Hammond seems from other considerations to have been led to the opinion that it had a different origin from either (*Am Journ of Med Sci* 1860 p 371) (*U S Dispensatory 15th Ed* 1771).

Structure of the Wood—Pale brown very coarse fibrous (*Kurz*)
' White, soft even grained annual rings faintly marked '

TIMBER
I210

I211

ANTIDESMA, *Burm Gen Pl III*, 284

A genus of trees or shrubs belonging to the Natural Order EUPHORBIACEÆ comprising some 60 species inhabitants of the warm temperate regions of the world

Leaves alternate entire, stipulate penniveined. *Flowers* dioecious, numerous small the male flowers in deciduous spikes the female racemose. *Calyx* 3 5 imbricate. *Petals* none. *Stamens* opposite the calyx lobes inserted round a rudimentary ovary. *Filaments* free. *Disk* of distinct glands alternating with the filaments and calyx segments. *Ovary* 1-celled with 2 pendulous ovules. *styles* 3 4 short united at the base. *Fruit* indehiscent, generally a 1-seeded drupe (*Wight s Ic* tti 766 768 819 and 821)

Antidesma Bunias, *Mull Arg DC Prod*, XV, 2, 262

Vern—*Himal cheri* NEPAL, *Kantjer* LEPCHA, *Nolas tali*, TAM, *Nuls tali* MAL

I212

A. I212

ANTIMONIUM

Antimony

Habitat—A small tree of North and East Bengal South India and Tenasserim

Botanic Diagnosis—Branchlets and buds tawny pubescent *stipules* ovate cordate *Flowers* small green sessile forming robust and branched spines in the axils of the leaves *Calyx* obsoletely 3 toothed *Stamens* 3 *Drupe*s elliptic red becoming black stone compressed

Food—According to Mr Gamble (*List of Darjeeling Shrubs Trees &c p 69*) the leaves and fruit are eaten Dr Trimen informs me that the fruits are also eaten in Ceylon

Structure of the Wood—Reddish, hard weight 46 lbs per cubic foot

Antidesma diandrum, Tulasne DC Prod, XV, 2, 266

Syn—STILAGO DIANDRA Roxb *Fl Ind Ed C B C 714*

Vern—Aamari sarshoti gur mussureya ban mussureya dhakki HIND
Mutta BENG Numari URIYA Kantjer LEPCHA Pella gumudu
masurbauri GOND Pella gumudu (?) TEL Matha SANTAL Amtua
sag MAL (S P) Patimil NEPAL Aimpalin BURM

Habitat—A small tree found in Garhwal Kumaon Oudh Bengal South India and Burma common in the hill forests of the Santal Pergunnahs

Botanic Diagnosis—Branchlets petioles and under side of leaves along the midrib with scattered rust coloured hairs *Flowers* pedicellate *Calyx* cup shaped *Stamens* 2 3

Food—The leaves are acid they are eaten They resemble sorrell and are made into chutney the fruit is also eaten (Gamble)

Structure of the Wood—Pinkish grey hard close grained Weight 41 lbs per cubic foot

A. Ghæsembilla, Mull Arg DC Prod XV 2 251

Syn—A PUBESCENS Willd and A PANICULATUM Roxb *Fl Ind Ed C B C 717*

Vern—Khudi jamb limtod BENG Umtou HAZARIBAGH Mata sure
KOL Pulsur polari jina pa laseru pollai TEL Jondri MAR Bu-
ambilla SINGH Byaitsin BURM

Habitat—A small deciduous tree met with in Nepal Oudh Bengal Burma Chanda and South India

Botanic Diagnosis—Branchlets young leaves and inflorescence soft tomentose *Flowers* sessile *Calyx* deeply 5 cleft *Stamens* 5

Food—The leaves are eaten in Bengal The berry is dark purple with a pleasant sub-acid flavour

Structure of the Wood—Red with darker coloured heartwood, smooth hard close and even grained Weight 49 lbs per cubic foot

A. Menasu, Mull Arg

Vern—Kumbyung tungcher LEPCHA Kin-pa lin BURM

Habitat—A small tree found in Sikkim Khasia Hills Burma and the Andaman Islands

Food—The fruit is eaten it is of a red colour

Structure of the Wood—Darkish red similar to that of **A. Ghæsembilla**, but the pores smaller and the medullary rays finer Weight 52 lbs. per cubic foot

ANTIMONIUM

Antimonium or Antimony, Black

Vern—Surme kâ-patthar surmah HIND Surme or shurme BENG
Surmah Isfahani BOMB Surmo surma no-pahro GUJ, Anjan

A. 1224

FOOD
Leaves
1213
Fruit
1214
TIMBER
1215

FOOD
Leaves
1216
Fruit
1217
TIMBER
1218

FOOD
Leaves
1219
Berry
1220
TIMBER
1221

FOOD
Fruit
1222
TIMBER
1223

1224

Celery

APIUM
graveolens.

anyan ka-patthar, DUK Anyanak kallu TAM Anjana-rayi TEL
Annanak kalla MAL Anyanam SANS Ismad, kohal ARAB Surmah,
sange surmah PERS

A black ore of antimony a tersulphide and called *surma* occurs in various parts of the Panjáb. The ore is imported from Kandahár and Ispahan but is also obtained in great abundance in the Himálayan range. This tersulphide is often confused by natives with galena as both can be reduced to a black powder. Iceland spar (carbonate of lime) is also called *surma* but is distinguished as *surma sufaid* or white antimony. Natives do not seem to be acquainted with the use of this metal as an alloy or even as a pure metal for scientific purposes. It is in fact only used as a cosmetic for the eye. It is also supposed to act as a tonic to the nerves of the eye and to strengthen the sight. But much of the antimony sold by druggists is really galena and is imported from Kábul and Bokhára. (*Baden Powell Panjab Products Vol I p 10*)

§ It is called *Surmar Ispahani* in Bombay to distinguish it from galena but it is by no means common in Bombay a few Persians only import it when there is a demand. (*Surgeon Major W Dymock Bombay*) Largely used by women in India as an application to the edges of the eyelids to improve personal appearance. (*Surgeon Major G A Emerson Calcutta*) It is also used to prevent the injurious effects of the glare of light on the eyes which it does by absorbing the rays. (*Brigade Surgeon G A Watson Allahabad*) It is supposed to have a cooling effect on the eyes protecting them from the glare of the sun. (*Surgeon K D Ghose Bankura*) Very good tonic for horses' (*Surgeon H D Masani Karachi*)

Antimony
1225

Antirrhinum glaucum, Linn, see **Linaria glauca, Spreng** SCRO-
PHULARIACEÆ

APIUM, Linn Gen Pl, I 888

1226

A genus of glabrous herbs (belonging to the UMBELLIFERÆ) comprising some 14 species scattered over the world one met with in India.

Leaves pinnate 3 partite or compound. Umbels compound often leaf opposed. Bracts and bracteoles absent (in the Indian species). Flowers white. Calyx teeth obsolete. Petals ovate acute tip inflexed. Fruit orbicular or elliptic slightly longer than broad, laterally sub compressed. Carpels semi terete subpentagonal plain on the inner surface. Primary ridges distinct filiform secondary absent. Furrows 1 vittate. Carpophore undivided or shortly 2 fid. Seed semi terete dorsally sub-compressed.

A genus very nearly allied to Carum. The word Apium was probably the Latin name for parsley it literally means water plant the words *ap*, *ab* and *av* in various languages meaning water — e g Panjáb or five waters.

Apium graveolens, Linn Fl Br Ind II, 679

1227

WILD AND CULTIVATED CELERY

Vern — *Ajmad bori ajmad karafs* HIND Chanu, rándhuni BENG, Bori ajamoda or ajmad BOMB Ajwankaputa budiyawan CUTCH; Karafs ARAB Karasb PERS Bhutjhata PB Vulg Saleri in the bazars of India. The Hindi Arabic and Persian names here given are more generally applied to the fruit of **Carum Roxburghianum**. (*Moodeen Sheriff*)

Habitat. — A native of England and other parts of Europe. Cultivated in different parts of India during the cold weather chiefly as a garden crop in the vicinity of towns for the use of the European population by whom it is eaten as a salad and pot herb or made into soup. It is also cultivated sometimes in Bengal for its seed, and in the Panjáb for its root.

A. 1227

**APLUDA
communis.****Apilotaxis Lappa—The Costus****MEDICINE
1228**

Botanic Diagnosis—Peduncle short leaf-opposed
Medicine—The officinal root is considered alterative and diuretic and given in anasarca and colic The seeds are also given as stimulant and cordial

§ As an antispasmodic celery is used in bronchitis and asthma and to some extent by natives for liver and spleen diseases it is regarded as emmenagogue (*Surgeon G A Emerson Calcutta*)

Celery is emmenagogue, and is used by hakims for the expulsion of stone" (*Asst Surgeon J N Dey Faipur*)

Carminative useful in colic dose 1 to 2 leaves (*Surgeon W Barren, Bhuj, Cutch, Bombay*)

**FOOD
1229**

Food—The seed is eaten as a spice by the natives and the blanched stems and leaf stalks by Europeans In the wild state it is to a certain degree poisonous but under cultivation it becomes a wholesome salad and pot herb In the Levant it is not blanched the green leaves and stalks are used as an ingredient in soups A form met with in France and Germany (and occasionally in India) is eaten as a vegetable after being boiled this is known as the turnip rooted celery The seeds tied into a piece of cloth are sometimes used to flavour soup

Apium involucratum, Roxb, see **Carum Roxburghianum, Benth**
UMBELLIFERÆ

1230

A. petroselinum or Parsley see **Petroselinum sativum, L**

A variety of this plant called *fusiformis* is grown chiefly as a vegetable the tap roots being boiled and eaten like parsnip

1231

APLOTAXIS DC, (en Pl II, 472

A genus of **COMPOSITÆ** chiefly found on the temperate Himalaya by modern botanists reduced to **Saussurea**

Apilotaxis auriculata, DC see **Saussurea hypoleuca, Spreng**

A candicans, DC see **Saussurea candicans, C B C**

A. gossypina, DC, see **Saussurea gossypifera, Don**

A. Lappa, Decne, see **Saussurea Lappa, C B C (THE COSTUS)**

1232

APLUDA, Linn Gen Pl, III 1137

Apluda aristata, Linn GRAMINEÆ

Syn—**A ROSTRATA** Nees *Roxb Fl Ind Ed C B C 109*

Vern—*Bhanguri bhanyra send BUNDLEKHAND Baru SAHARANPUR Goroma BENG Putstrangali (?) TEL*

Habitat—A creeping perennial grass commonly found in hedges or other shady places in the plains of northern India, and in the Himalayas, ascending to 7 000 feet in altitude

**FODDER
1233**

Fodder—Used for fodder in the Banda district (*Duthie's List of Grasses, p 24*)

1234

A communis, Nees

Habitat.—Plains of the Panjáb and North West Provinces, ascending to low altitudes on the Himalaya

A 1234

The Dogbane Family

APOCYNACEÆ

Apluda geniculata, Roxb *Fl Ind, Ed C B C*, 109Vern —*Tachla* MUSSOORIE

Habitat —Panjáb and the Himálayas up to 9 000 feet Simla Pesháwar

1235

APOCYNACEÆ—The Dogbanes

1236

Erect or twining shrubs rarely herbs or trees *Leaves* opposite or whorled (scattered in *Cerbera* and *Plumeria*) quite entire exstipulate *Flowers* in terminal or axillary cymes hermaphrodite regular *Calyx* in ferior lobes 5 rarely 4 imbricate often glandular within at the base *Corolla* rotate or salver shaped lobes 5 rarely 4 spreading contorted and often twisted in bud very rarely valvate *Stamens* 5 rarely 4 on the tube throat or mouth of the corolla filaments usually short anthers oblong linear or sagittate conniving connective sometimes adhering to the stigma cells 2 dehiscing lengthwise sometimes produced downwards into an empty spur pollen granular *Disk* annular cupular or lobed or of glands or o sometimes concealing the ovary *Ovary* 1 celled with 2 parietal placentas or 2 celled with axile placentas or of 2 distinct or partially connate carpels style simple or divided at the base only top thickened stigma 2 fid acute or obtuse *Ovules* in each cell 2 or few or many and 2 8 seriate rarely solitary *Fruit* a dry or fleshy drupe berry or samara or of 2 drupes berries or follicles *Seeds* various often winged or with a terminal pencil of long silky hairs (*Coma*) albumen hard fleshy or scanty or o embryo straight cotyledons flat concave convolute or contorted radicle usually superior *Distrib*—Species about 900 chiefly tropical

Tribe I Carrissæ *Anthers* included free from the stigma cells rounded at the base *Ovary* of 2 wholly combined carpels 1 2 celled *Fruit* large usually fleshy or pulpy within *Seeds* without wing or pencil of hairs *Corolla lobes* overlapping to the left in all

* *Ovary* 1 celled with parietal ovules

| | | | |
|-------------------|---------------|---|---------------------|
| Fruit indehiscent | Albumen o | 1 | Willoughbeia |
| Fruit 2 valved | Albumen horny | 2 | Chilocarpus |

** *Ovary* 2 celled with axile ovules

| | | | |
|--------------------------------------|---------------------------------|-------|---------------------|
| Flowers 4 merous | Erect shrubs | Seeds | |
| exalbuminous | | | 3 Leuconotis |
| Climbing shrubs | Corolla mouth with lobed scales | | 4 Melodinus |
| Climbing slender unarmed shrub | Corolla mouth naked | | 5 Winchia |
| Erect or stout climbing armed shrubs | | | 6 Carissa |

Tribe II Plumeriæ *Anthers* included free from the stigma cells rounded at the base *Ovary* of two distinct carpels united by the style *Fruit* various *Seeds* peltate *Corolla lobes* overlapping to the left except in **Ochrosia**

Subtribe 1 Rauwolfiæ *Calyx* eglandular within *Carpels* 1 2 rarely 4 6-ovuled *Fruit* of 2 1 seeded drupes or berries rarely moniliform (of superposed drupes)

| | | |
|------------------------|--------------|--------------------|
| Leaves usually whorled | Disc present | |
| Albumenwen | | 7 Rauwolfia |
| Leaves usually whorled | Disc o | 8 Alyxia |
| Albumen ruminant | | |
| Leaves opposite | Disc o | 9 Hunteria |
| smooth | Albumen | |

T

A 1236

APOCYNACEÆ

Analysis of the Apocynaceæ

Subtribe 2 Cerberæ *Calyx* glandular within *Carpels* 2 rarely 4 ovuled ovules on opposite sides of a thick placenta *Drupe*s or berries 1 seeded or 2 seeded the seeds separated by the enlarged placenta

- Leaves scattered alternate Corolla funnel shaped 10 **Cerbera**
 Leaves opposite Corolla salver shaped lobes overlapping to the right 11 **Ochrosia**
 Leaves opposite Corolla salver shaped 12 **Kopsia**

Subtribe 3 Euplumeriæ *Calyx* glandular within *Carpels* 6-∞ ovuled *Fruit* (in the Indian genera) of 2 follicles

* *Ovules* 2 *seriate*

- Disc annular or obscure Seeds winged
 Leafless shrub 13 **Rhazya**
 Disc of 2 scales Seeds truncate at both ends 14 **Vinca**

** *Ovules* ∞ *seriate*

- Erect trees Leaves scattered alternate Seeds winged 14 ***Plumeria**
 A climber Leaves opposite or whorled Seeds winged 15 **Ellertonia**
 Erect trees or shrubs Leaves whorled Seeds comose Style distinct 16 **Alstonia**
 Erect trees Leaves whorled Seeds winged Style 0 17 **Dyera**
 Erect trees Leaves opposite Seeds comose Style short 18 **Holarrhena**

Subtribe 4 Tabernæmontanæ *Calyx* glandular within *Carpels* ∞ ovuled *Fruit* fleshy or coriaceous dehiscent or not

- Erect trees or shrubs 19 **Tabernæmontana**

Tribe III Echitideæ *Anthers* included or exerted conniving in a cone around the top of the style and adherent to it by a point on the connective cells produced downwards into a subulate empty spur *Ovary* of 2 distinct carpels united by the style *Fruit* of 2 follicles *Seeds* comose at one or both ends Exceptions see **Parsonsia**

Subtribe 1 Parsonsiæ *Corolla* rotate or salver shaped throat naked except **Wrightia** *Anthers* more or less exerted

- Corolla* lobes valvate *Carpels* connate in flower 20 **Parsonsia**
Corolla rotate mouth naked Connective thickened at the back 21 **Vallaris**
Corolla salver shaped mouth naked 22 **Pottsia**
Corolla rotate or salver shaped mouth with scales 23 **Wrightia**

Subtribe 2 Nerieæ *Corolla* throat broad with 5-10 scales. *Anthers* included

- Shrubby erect Leaves whorled
Corolla lobes short Follicles erect 24. **Nerium**
 Shrubby or twining Leaves opposite
Corolla lobes long or tailed Follicles spreading 25 **Strophanthus**
 Herbaceous Leaves opposite *Corolla* lobes short Follicles slender 26 **Apocynum**

The Dogbane Family

APOCYNACEÆ.

Subtribe 3. Euechitidæ *Corolla* various mouth naked *Anthems* included

* *Corolla lobes valvate overlapping to the left*

- Flowers small or minute *Corolla*
 urceolate lobes valvate 27 **Urceola**
 Flowers small *Corolla* subcampanulate
 lobes overlapping 28 **Parameria**

** *Corolla lobes overlapping to the right*

- α *Corolla very large*
 Immen e climbers corolla bell or funnel
 shaped 29 **Beaumontia.**
 Lofty climbers *Corolla* salver shaped 30 **Chonemorpha.**
 β *Corolla minute urceolate lobes very short*
Ovary exserted from the disc Seeds
 beaked 31 **Ecdysanthera**
 γ *Corolla small or medium sized salver shaped lobes nearly straight*
or slightly twisted to the left in bud
Ovary hidden in the disc Seeds
 slender 32 **Baissea**
Ovary hidden or not in the disc Seeds
 ovate or oblong 33 **Aganosma.**
 δ *Corolla small salver shaped lobes sharply twisted to the left in*
bud tips not deflected
Ovary hidden in the disc Seeds
 slender 34 **Epigynum**
Ovary exserted from the disc Seeds
 beaked 35 **Rhynchodia.**
Ovary exserted from the disc Seeds not
 beaked 36 **Trachelospermum**
Ovary hidden in the disc Seeds ovate
 beaked 37 **Anodendron**
 ε *Corolla small salver shaped lobes sharply twisted to the left in bud*
with the tips deflected
 Seeds ovate beaked 38 **Ichnocarpus**
 Seeds ovate not beaked 39 **Micrechites**

(*Flora of British India* III 61)

The above extract from the *Flora of British India* has been published here in the hope that it may be found useful in suggesting the genera belonging to APOCYNACEÆ many of which will be found described in greater detail in their respective alphabetical positions

Distribution.—The Natural Order APOCYNACEÆ contains in all some 900 species chiefly inhabiting the intertropical zones of the Old and New Worlds Few species are indigenous to the extra tropical or warm temperate zones and still fewer are truly temperate

In India there are 147 species (some 15 of which are doubtfully distinct or are introduced) arranged in 40 genera Of these 99 or 67·3 per cent are confined to the plains 44 or 29·9 per cent occur on the lower hills and 7 or 4·7 per cent ascend above 5 000 feet in altitude In the Eastern Peninsula 97 or 66 per cent occur South India and Ceylon have 14 or 9·5 per cent in the Western Peninsula only 8 species are met with or 5·4 per cent and in North or Upper India only 2 species appear to be peculiar to the drier tracts or 1·3 per cent while in cultivation all over India or wild in two or more of the four preceding divisions

APOCYNACEÆ**Analysis of the Apocynaceæ**

some 26 species are met with equal to 17·7 per cent of the entire Indian Apocynaceæ. Of these less local species the Eastern Peninsula and South India take the greater number. South India and the Western Peninsula are next in importance, few only extend from the other divisions into North India.

From this analysis it appears that in the Eastern Peninsula (and on the plains of that division) of India the vast majority of the Apocynaceæ occur, the eastern region thus preserving its feature as the home of Indian tropical plants; it is consequently the division of India most suited for introduced Apocynaceæ. (Compare with the account given under *Anonaceæ*, *Asclepiadeæ*, &c.)

1238

Affinities of the Apocynaceæ—They have their closest resemblances to *Asclepiadaceæ*, *Loganiaceæ* and *Gentianeæ* on the one side and to *Oleaceæ* and *Jasminaceæ* on the other. From *Asclepiadaceæ* they are at once separated by the condition of the anthers generally united together in the dogbanes, with free filaments and free from although embracing the stigma—the anthers and filaments in *Asclepiadaceæ* being completely united to the style and stigma. From *Loganiaceæ* they are separated by the absence of intrapetaloid stipules. In most *Apocynaceæ* the carpels are two, free from each other except by the united and common stigma. When the fruit of the *Apocynaceæ* like that of the *Loganiaceæ* is a solitary capsule, berry or drupe, they are distinguished by the milky sap, always isostemonous corolla and united anthers, and by the leaves being opposite or whorled and exstipulate. The *Loganiaceæ* have winged but never comose seeds.

Through *Loganiaceæ* they have an affinity to *Rubiaceæ* from which the position of the ovary at once separates them, superior in *Apocynaceæ* but inferior in *Rubiaceæ*. From *Gentianeæ* they are at once distinguished by their woody stems or more or less arborescent habit with milky juice, the *Gentianeæ* being herbs with watery juice, free anthers and a one-celled ovary having two parietal placentas with many seeds.

From *Oleaceæ* and *Jasminaceæ* they are at once separated by the anisostemonous corolla of these orders.

1239

Properties and Uses of the Apocynaceæ—Most of the species possess a milky sap, often rich in India rubber and Cutta percha. In India *Alstonia scholaris*, *Chonemorpha macrophylla*, *Parameria glandulifera*, *Urceola elastica*, *U. esculenta*, *Willoughbeia edulis*, and other species yield India rubber. A form of *Alstonia scholaris* at Singapore is said to afford part of the *Gutta pulei*, and two species of *Dyera* met with in the forests of Malacca, Singapore and Sumatra yield the *Gutta jelutong* of commerce. Other India rubber genera belonging to this order are *Vahea gummiifera*, Lam. in Madagascar, *Hancornia* in Brazil and *Landolphia* in West Africa. In other species the milky sap, while containing less caoutchouc, has often other properties. It is purgative and febrifuge in *Allamanda*, *Carissa*, and *Plumeira*. It is mildly bitter and laxative in *Cerbera*, and in the fruits of certain species it is acid sweet; they are accordingly eaten as edible fruits, such as *Carissa*, *Carandas*, *Willoughbeia edulis*, *Urceola elastica*, and *Tabernaemontana utilis*. At other times the sap is acrid and very poisonous, as in the Madagascar ordeal plant *Tanghinia venenifera*, a seed of which is sufficient to poison 20 persons. The wood, flowers and leaves of the Oleander—*Nerium odoratum* and *N. Oleander*—are very poisonous. So also are the nuts of *Thevetia nerifolia*.

Some are medicinal, the *CONESSI BARK* or the bark of *Holarrhena antidysenterica* and the bark of *Thevetia nerifolia* and of *Alstonia scholaris* are most valuable antiperiodics, useful in malarious fevers.

Structure of the Wood.—Most of the *APOCYNACEÆ* are arborescent, but

TIMBER
1240

A 1240

The Aponogeton.

APONOGETON
monostachyum

the timber is as a rule of poor quality. It is white soft without heart wood the pores are small and the medullary rays fine and numerous. *Alstonia* is perhaps the only exception to this character the pores being of moderate size and the rays distant.

Many are handsome ornamental trees bushes or climbers much cultivated in Indian gardens. Amongst the most important may be mentioned the species of *Allamanda* and *Alstonia*—the latter are large shrubs or trees. *Beaumontia grandiflora* a truly superb climber with pendulous white flowers 6-8 inches long is also common. *Kopsia fruticosa*, with its rose-coloured flowers. *Echites caryophyllata*, the clove scented Echites (*md lati*) and other species are elegant climbers frequently seen rambling over trees. *Nerium odorum*, or Indian Oleander with its pink dark red or white flowers is a constant companion with the mango tree in the gardens of the natives and justly deserves its great popularity. *Plumeria acutifolia* (*gul i chin*) is less frequent in native gardens it is a very ornamental small tree when covered with its clusters of whitish pink flowers and large spreading leaves. Its long naked branches and gouty stem are perhaps its chief drawback it is exceedingly plentiful in gardens in the neighbourhood of Calcutta. *Parsonsia corymbosa* (*spiralis*, Wall.) is a beautiful scandent shrub its bright crimson flowers appearing in the hot season. *Rauwolfia serpentina* of which Sir W. Jones says 'Few shrubs in the world are more elegant especially when the vivid carmine of the perianth is contrasted not only with the milky white corolla but with the rich green berries which at the same time embellish the fascicles'. *Thevetia nerifolia* (*sard kuné*) has made far more progress probably than any other introduced dogbane. Every garden wall in Bengal one might almost say is decorated with a few plants of this elegant small spreading tree or bush which throughout the year is covered with its large yellow sweetly scented flowers. The odour of these flowers at first much too strong for most Europeans becomes more delicate after a time and indeed exercises such an influence over the olfactory nerves that they lose the power of smelling it. *Tabernaemontana coronaria* (*chandui*) is probably after *Nerium* the next most popular plant in Indian gardens. Flowers large single or double and pure white delicately scented at night. *Vinca alba* and *rosea* must not be omitted from this list of garden Apocynaceae. Indeed two or three varieties of the periwinkle are perhaps the most constant herbaceous favourites and associated with the balsam and the Indian yellow marigold (*géndha*) abound in every native garden.

A few species of Apocynaceae yield dyes. *Wrightia tinctoria* is used in some parts of India for the manufacture of indigo and *W. tomentosa* yields a yellow juice used as a dye.

APONOGETON, Thunb. Gen. Pl. III 1013

1241

A genus of submerged aquatic herbs belonging to the Natural Order NAIADACEAE.

Leaves on long petioles floating on the surface very much like a Potamogeton only green color red. *Spike* solitary generally bifurcating into two recurved portions. *Flowers* hermaphrodite situate within two highly coloured bracts. *perianth* absent. *Stamens* 6-many hypogamous *filaments* unequal subulate. *anther* small. *Ovary* of 3-6 distinct *carpels* oblique sessile *stigma* oblique disciform. *Ovules* 2 many erect anatropous basilar *carpels* 3 mature or more.

Aponogeton monostachyum, Linn.

1242

Vern—Ghechu HIND. Khaangr SANS. Kottis katang or kottis kishangu TAM. Kotti gadda nama TEL. Kottis kang DUK.

Habitat—A native of shallow, standing, sweet water in Bengal, appearing during the rains.

A 1242

AQUILARIA

Aquilaria

FOOD
Roots
1243

Food—The natives are fond of the roots which are said to be nearly as good as potatoes (*Roxb*) It is remarkable that this property should have been detected while the tubers of its associate *Sagittaria*, have escaped discovery

1244

APOROSA, *Blume Gen Pl III 282*

A genus of trees or shrubs (belonging to the Natural Order EUPHORBIACEÆ) comprising some 20 species inhabiting Asia and chiefly the Malayan Peninsula

Leaves alternate simple petiolate entire penninerved *Flowers* dioecious minute enclosed by the bracts forming spikes or racemes *Males* forming clusters *females* short few flowered *Calyx* 3-6 often unequal membranous imbricate *Petals* and *disk* absent *Stamens* 2-5 long free inserted around rudiment of the pistil *anther* small *cell* subglobose distinct united through out their length to a more or less thickened connective dehiscence by a longitudinal slit on each cell *Female flowers* solitary within the involucre sessile *Ovary* 3 rarely 2-4 celled with 3 ovules in each cell *Capsule* fleshy in dehiscent endocarp referred to 3 one seeded pyrenes

1245

Aporosa dioica, *Mull Arg DC Prod XV, 2, 472* EUPHORBIACEÆ

Syn—A ROXBURGHII *Baill* ALNUS DIOICA *Roxb* LEPIDOSTACHYS ROXBURGHII *Wall*

Vern—*Aokra* BENG *Sanpau* GARO *Tanprengjan* MAGH

Habitat—A tree of North and East Bengal and Burma

Botanic Diagnosis—*Style lobes* simple short *Ovary* thinly appressed pubescent glabrescent (*Kurz*)

TIMBER
1246

Structure of the Wood—Dark brown very hard close grained with white sapwood weighing 79 lb per cubic foot

This has by botanists been identified as the tree which yields in the West Indies the Coco-wood of commerce The Indian plant should be carefully examined to ascertain if the wood obtained from it is of equally good quality with that obtained from the West Indies

1247

A villosa, *Baill DC Prod XV 2 471*

Vern—*Ya mein* BURM

Habitat—A tree frequent in the Eng forests of Burma from Pegu to Martaban (*Kurz*)

Botanic Diagnosis—*Leaves* shortly and softly pubescent beneath *Ovary* villous tomentose or pubescent *Berries* densely velvety tomentose (*Kurz*)

RESIN
1248
DYE
1249

Resin—Yields a red resin

Dye—The bark is used as a red dye

Apple, The, see *Pyrus Malus*, *Linn* ROSACEÆ

Apricot, The, see *Prunus armeniaca*, *Linn* ROSACEÆ

1250

AQUILARIA, *Lam Gen Pl III 200*

A genus of trees belonging to the Natural Order THYMELÆACEÆ comprising only 2 or 3 species inhabitants of tropical South West Asia—the Malaya and Borneo

Leaves alternate entire or nearly so *petiolate* exstipulate penninerved nerves close parallel *Flowers* pedunculate in subsessile umbels axillary or terminal *Bracts* absent *Flowers* hermaphrodite *Perianth* forming a distinct campanulate tube (sometimes described as the campanulate floral receptacle) (calyx) *teeth* 5 broad ovate acute or obtuse imbricate in bud *Squamules* (or corona like scales) equal in number to the stamens and alternate with them inserted on the mouth of the tube erect very hairy *Stamens* 10 inserted

A 1250

Calambac or Eagle-wood

AQUILARIA
Agallocha.

below the squamules and with the sepals therefore perigynous *filaments* short very rarely elongated *anthers* basifixed ovate or oblong introrse *Ovary* subsessile in the bottom of the tube free perfect or imperfect hairy 2 locular or 1 locular the placentas being along the middle of the valves *Fruit* drupaceous becoming capsular surrounded below by the persistent perianth tube *Seeds* 1 3 often 2 ovoid raphe ventral produced in a more or less spongy cone *cotyledons* fleshy plano-convex *radicle* short inferior

Aquilaria is derived from the Lat *Aquila* the eagle hence the name Eagle-wood

Aquilaria Agallocha, Roxb DC Prod, XIV, 601

1251

CALAMBAC AGALLOCHUM OR ALOE WOOD OR EAGLE WOOD,
LIGNUM ALOES AGLIA AKYAW

Vern—*Agar* HIND *Agaru ugar*, BENG *Agaru* SANS *Agare hindi* ud, or aud or aude hindi or ude hindi ARAB *Agre hindi agar* PERS *Hindiagara* BOMB *Agar* GUJ *Agar aggalichanuana* TAM *Agru* TEL *Sasi* ASS *Akyau* BURM *Kihay sinnah* SINGH *Kayu garu* MALAY *Nwahmi* SIAM *Nyaw chah* CHINESE

Habitat—A large evergreen tree of Sylhet and Tenasserim distributed to the Malay Peninsula and Archipelago

Botanic Diagnosis—*Capsules* wrinkled softly and densely tomentose (*Kurz*)

History—Since the time Dr Roxburgh described this plant scarcely any further information has been obtained. The conclusion he arrived at seems correct namely that the much prized wood is obtained from eastern India and from the forests to the east and south east of Sylhet extending through Manipur Chittagong Arakan to Mergui and Sumatra. From India it finds its way to China and from Cochin China it was first re-exported to Europe hence in all probability the association of the plant with that country. Loureiro described a plant under the name of *Alcexylon Agallochum*, said by him to be a native of Cochin China and to yield the true Calambac wood or Agallocha. His description is incomplete and his genus has therefore been set aside by Benth and Hooker in their *Genera Plantarum* while the plant has never since been identified or re-collected. DeCandolle, in the *Prodromus* refers it to Leguminoæ

HISTORY
1252

Dr Royle regards the Aloes wood of the Scriptures as the *Ahila* or *Ahalim* of the East so famed for its fragrance and that it is yielded by *Aquilaria Agallocha*. Gamble says that *Akyau* (the Burmese name for Agallocha) is the most important produce of the forests of South Tenasserim and the Mergui Archipelago. It is found in fragments of various shapes and sizes in the centre of the tree and usually if not always where some former injury has been received.

An enquiry into the history of Aloes wood shows that an odoriferous wood bearing the name of *Ahalot* was known to the ancient Jews the same substance appears to have been called agallochon by the Greeks and Romans. The early Arabs corrupted this term into *Agha lukhi* but subsequently adopted the terms *Ood* (or *aud*) meaning wood and *Ood hindi* (Indian wood) as the technical names for Aloes-wood. In Sanskrit it is called *Agaru* from which is derived the modern Hindi name *Agar*. Upon the subject of *Ood Mir Muhammad Hosein* has the following remarks. *Ood* in Hindi *Agar* is the wood of a tree which grows in the Jaintiya hills near Sylhet a dependency of the Suba of Bengal situated towards the north-east of Bengal proper. The tree is also found in the islands to the south of Bengal situated north of the equator, and in the Chatian islands belonging to the town of Nawaka near the boundaries of China. The tree is very large the stem and

A 1252

**AQUILARIA
Agallocha.****Aloe-wood or Agar****HISTORY**

branches generally crooked the wood soft From the wood are manufactured walking sticks cups and other vessels it is liable to decay and the diseased part then becomes infiltrated with an odoriferous secretion In order to expedite this change it is often buried in wet ground Parts which have undergone the change above mentioned become oily heavy and black They are cut out and tested by being thrown into water those which sink are called *Ghark* those which partly sink *Neem Ghark* or *Samaleh* and those which float *Samaleh* the last kind is much the most common *Ghark* is of a black colour and the other qualities dark and light brown According to other and older authorities *Ood* is classified as *Hindi Samandooree Kamari* and *Samandalee Hindi* is described as black *Samandooree* as more oily than *Hindi Kamari* as pale-coloured *Samandalee* as very odoriferous Elsewhere it is described as *Barree* and *Jabali* the latter having black lines in it the former white others again described *Barree* as having black lines and *Jabali* white

Samandooree Ood is said to be called after the place whence it is obtained also *Kamari*

The best kind for medicinal use is *Gkark Ood* from Sylhet it should be bitter odoriferous oily and a little astringent other kinds are considered inferior In most receipts raw *Ood* (*Ood i kham*) is enjoined to be used to prevent the use of wood from which the oil has been abstracted by crushing and maceration in water or by crushing and admixture with almonds which are afterwards expressed This precaution is the more necessary as *Ood* shavings are an article of commerce in India under the name of *Choor agar* they are often adulterated with chips of Sandalwood or *Tagger* an odoriferous wood much like *Aloes* and common in India I have also heard mention made of the kind of *Ood* which is described by the author of the *Ikhtiarat i badi* as coming from Bunder Cheeta ten days sail from Java and esteemed equal in value to its weight of gold this kind is said to have no smell until warmed When taken in the hand it diffuses a delightful odour (possibly Bunder Cheeta has been written in mistake for Chaiyan) There is another kind of wood common in India which resembles *Aloes* in appearance consistence and oiliness it is called *Tagger* and is often sold for *Ood* (*Makhsan* article [*Ood* or *Aud*])

Rumphius Kämpfer, and others have written at some length on *Aloes* wood but have not thrown much light upon the subject (*Confer Guibourt Hist Nat Tom III p 336*) **Guibourt** describes five kinds of *Aloes* wood from the examination of specimens which he has met with in Europe The first a specimen in the *Ecole de Pharmacie* he attributes to **Alexylon Agallochum**, the second which he considers to be the produce of an *Aquilaria*, is the ordinary *Aloes* wood of European commerce The fifth which is very heavy oily and resinous he thinks must be produced by **Excacaria Agallocha** in this wood there are vities filled with a reddish resin **Guibourt's** first and second kinds are more minutely described by **Planchon** The varieties of *Agar* found in the Bombay market are three Siam or Mawurdhee Singapore and Gá gulee Besides these we have *Tagger* from Zanzibar and a false *Aloes* wood (*Dymock Mat Med W Ind pp 239-241*)

No further evidence having come to light of the existence of *Agallocha* wood in Cochin China, it is probable that the odoriferous wood was not the product of the tree described by **Loureiro**, but was an importation obtained from India There are many plants however which resemble the *Agallocha* in the odour of their wood resin or sap and it is therefore probable that Cochin China may possess one of these The saps of **Excacaria Agallocha**, *L* a small tree found along the coast of

Aloe-wood or Agar

AQUILARIA
Agallocha

Burma from Chittagong to Tenasserim is supposed to resemble Agallocha hence the specific name (see *Excacaria*). So also the resinous excretions from various members of the Myrrh family have been erroneously associated with the *Agar*. This in all probability is the explanation of *Balsamodendron Agallocha*, *W & A* as in *Drury* the description of which most probably contains a compilation of the characters attributed to *B Mukul B Roxburghii* and *Aquilaria Agallocha* Smith, in his *Dictionary of Economic Plants* seems to lay stress upon Agallocha being the vernacular name for *Excacaria Agallocha* but the name Agallocha does not appear to be of Indian origin.

Resin—The wood of this tree is impregnated with a resinous principle often found collected in masses here and there throughout the stem. This curious fact is in all probability due to some diseased condition which might be artificially produced in order to increase the formation or collection of the resin. To obtain this sweetly scented resin the trees are hewn down and cut to pieces while searching for the masses of resin.

THE WOOD CHIPS (*chura agar*) are largely sold in the bazars and used either by themselves or associated with *Bdellium* as incense burned at Hindu temples. They are also boiled and the water thereafter distilled in order to prepare *Agar atar* (or *agar ka itr*) a perfume much admired by the people of India.

Fibre—The bark is used in Assam for covers of unbound books (*Mr H Z Darrah Director of Agriculture Assam*).

Medicine—The fragrant resinous substance is considered cordial by some Asiatic nations. It has been prescribed in gout and rheumatism (*Ainslie ex Voigt's Hortus Suburb Calcut*). *Loureiro* observes that the Calambac is a delightful perfume serviceable in vertigo and palsy and the powder is useful as a restrainer of the fluxes and vomiting. In decoction it is useful to allay thirst in fever.

Baden Powell says that aloe wood is supposed to owe its fragrance to the rotting of the wood and the best specimens are therefore buried in earth for some time. It was formerly much used in Europe in gout, rheumatism, diarrhoea, vomiting and palsy. The name aloe wood has nothing to do with aloes but is a corruption of the Arabic term *Al ud* (or *al aud*) (*Baden Powell Panjab Products I 337*). An essential oil prepared from the wood is also used medicinally.

§ Internally in fevers externally in colic (*Surgeon Major D R Thompson Madras*). The otto of ood is considered cooling and is an ingredient in many eastern perfumes (*Surgeon Major A S G Faya kar Muskat Arabia*).

Structure of the Wood—White soft even grained scented when fresh cut. Weight about 25 lbs per cubic foot. In the interior of old trees are found irregular masses of harder and darker coloured wood which constitute the famous Eagle wood of commerce called *Kaya garu* by the Malays and *Akyau* by the Burmese (*agaru* Sans).

Kurz says of this wood very light yellowish white coarse fibrous but closely grained takes a pale brown polish. Used by the Karens for bows. The fragrant wood *Ood* is also largely used for making jewel cases and, indeed, precious stones are very frequently set in it. Aloes wood is also largely used for making ornaments and rosary beads.

Eagle-wood is stated to bring about £30 per cwt for 1st quality (Sumatran), £20 2nd quality (Malaccan) and £2 10 3rd quality (Malaccan and Indian). It should melt like wax and emit an agreeable odour. There seems considerable confusion in the use of the word Eagle wood. It apparently is applied to the masses highly impregnated with the gummy substance as well as to the timber.

RESIN
I253PERFUME
I254MEDICINE
Resinous
substance
I255OIL
I256TIMBER
Ordinary
I257Selected piece
of perfumed
I258

**ARACHIS
hypogæa****The Ground Nut**

1259

Aquilaria malaccensis, Lamk DC Prod, XIV, 602

GARODE MALACCA OR MALACCA EAGLE WOOD

Habitat—Said to be met with in Tenasserim**Botanic Diagnosis**—An evergreen tree the young shoots of which are covered with adpressed hairs Capsules smooth and glabrous (Kurs)**Arabic Gum**, see *Acacia arabica* and *A Senegal*

1260

ARACHIS, Linn Gen Pl I 518

A genus of Brazilian herbaceous prostrate annuals (belonging to the LEGUMINOSÆ Sub-order PAPILIONACEÆ) comprising some 6 or 7 species one of which is now cultivated throughout the tropical and extra tropical regions of the globe

Leaves abruptly pinnate 2 jugate or rarely 3 foliolate leaflets exstipulate; stipules adnate to the base of the petiole Flowers in dense axillary spikes Receptacle more or less concave lined by the disk Calyx gamosepalous either tubular or saciform at the base or else 2 partite anterior sepal free to the base 4 superior connate to a considerable height and membranous teeth imbricate Petals very unequal standard suborbicular scarcely tapering at the base thickened gibbous at the back wings oblong free keel curved beaked and tapering for a considerable distance at the apex Stamens 9 or 10 1 adelphous tube more or less thickened and fleshy at the base anthers of 2 forms 5 oppositipetalous shorter sub globose versatile 5 alternipetalous elongated basifixed Legume sub sessile few-ovuled oblong thick reticulated sub toruloseThe generic name is derived from the Greek name for a leguminous plant *αρακος* or *αραχος* referred to by Pliny which had neither stem nor leaves The specific name of the plant met with in India (*A hypogæa*) is derived from *υπογειος* = subterranean

1261

Arachis hypogæa, Linn Fl Br Ind II 161 LEGUMINOSÆ

THE GROUND NUT OR EARTH NUT OR PEA NUT

Vern—Buchanaka SANS Mat kalai chiner badam bilati mung BENG Mungphali vilayeti mung HIND Bhoni mug SIND Bhôya chena bhô-mag GUJ Bhui chane bhui muga or lhu sheng vilayati mug BOMB MAR Vérk kadalai nilak kadalai IAM Verushanaga k ya verushanaga TEL Nelak katala vérk kalí MALA Nelgale kayi kadale kayi KAN Rata kaju SINGH Mibé myépe maibai BURM**Habitat**—An annual of South America now generally cultivated throughout India but chiefly in South India and Bombay also in certain parts of Bengal and more rarely in Upper India

This plant was not known in the Old World before the discovery of America Dr Dymock thinks the ground nut reached India through China It does not appear to have been cultivated for more than 50 years It may have come to Western India from Africa

Botanic Diagnosis—After the flowers wither the torus (which supports the ovary) becoming elongated in the form of a thick rigid stalk and curving downwards by alternately bending upon itself from one side to another forces the pod underground, and in this position the peas are ripened In India this curious plant often attracts to itself a large number of red ants which in gardens in Bengal seem regularly to soften and pulverize the soil as if to facilitate the movement of the pod It would be interesting to know whether the same fact has been observed in other parts of the world and if so to discover whether the plant feeds these useful insects in return for their assistance They do not appear to eat the nuts or peas**Cultivation**.—Ground nuts do not appear to require much care in**A 1261**

The Ground Nut

ARACHIS
hypogaea

cultivation They grow best on dry sandy soil Watering is not needed nor any particular observance as to the time when supplies of seed are put down nor when they are reaped With the close of the grain reaping season extensive plots of land especially in the Chingleput South Arcot parts of the Tanjore and Trichinopoly districts are sown broadcast with ground nuts (*Trop Agr* III 774) An average good crop will yield as much as 50 bushels from the acre In 1879 the total area under the cultivation of ground nuts in India was ascertained to be 112 000 acres and almost exclusively confined to Madras Bombay Berar and Mysore In hard soils the crop proves objectionable from the difficulty to remove the nuts from the soil many remaining and the plant thus becoming a troublesome weed

Oil—The seeds of this plant afford on expression a clear straw coloured non drying oil which resembles olive oil in taste and in India is now being used as a substitute for it in medicinal preparations As a lamp oil it has for some time been used and has the reputation of burning longer but giving a less luminous flame It has however one important advantage over other lamp oils—it will keep for a longer time without becoming rancid In North Arcot it is reported to be used for adulterating gingelly oil and in Pondicherry it is said to be mixed with cocoa nut oil

OIL
1262

In Europe it is now extensively used as a substitute for olive or salad oil both medicinally and for alimentary purposes It has taken a distinct place in the soap manufacture and it is largely consumed for lubricating machinery as a lamp oil and for dressing cloth According to **Dumas** a Marseilles merchant was the first who experimented with the ground nut oil as a substitute for olive oil The suggestion to do so is said to have been given by a French colonist **Joubert** in 1840 Little more than 40 years ago the oil was unknown to European commerce and now the annual consumption is perhaps little short of 100 000 tons prepared oil a year The chief emporiums of the European trade are Barcelona Marseilles and Genoa

The yield of oil is often as much as 50 per cent the average Pondicherry about 37 per cent and the Madras 43 per cent The quality of the oil from cold expression is much finer than when heat is employed but in the latter case the volume is much increased Formerly this oil was more extensively expressed in India than at the present date In an official communication from the Board of Revenue Madras to the Government of India it is stated that in 1877 7 130 cwt of nuts and 20 387 cwt of oil were exported from Madras With the increased trade in the nuts the preparation of the oil seems to have declined in India The Suez Canal having lessened the time occupied on the voyage to Europe the nuts can now be exported in a good condition and this fact together with the improved machinery used on the Continent have combined to render the oil the least important part of the trade in this product The nuts either shelled or not constitute the chief export trade and within the past few years this trade has rapidly developed so that at the present moment it must be viewed as a most important item in the exports of South India An effort is however being made to open out a company with European machinery to express the oil in India there would seem to be a good future for such an industry

TRADE RETURNS

1263

In a Resolution of the Government of India, Revenue and Agriculture Department dated November 1877 will be found some interesting facts regarding the trade in ground nuts The following extract shows the condition of the French trade in 1875 "Although the exports to foreign

A. 1263

**ARACHIS
hypogæa****Trade Returns of Ground Nuts.**

countries from British India are trifling considerable quantities are sent from Pondicherry to France as will be seen from the following figures which have been extracted from the French trade returns of 1875 —

| | Kilogrammes | Francs |
|----------------------------|-------------|-----------|
| Imports from British India | 1 231 803 | 406 494 |
| French | 6 404 899 | 2 113 616 |

The total imports into France in that year from all countries were 101 524 468 kilogrammes or nearly 100 000 tons worth 33 503 000 francs. Thus out of 33½ millions of francs only 2½ millions stand against India. Nearly all the rest is imported from the West Coast of Africa.

Exports of Farth nuts from British India

| YEARS | Weight | Value |
|---------|---------|-----------|
| | Cwt | R |
| 1878-79 | 25 472 | 1 68 420 |
| 1879-80 | 45 435 | 2 85 519 |
| 1880-81 | 188 381 | 10 07 818 |
| 1881-82 | 373 317 | 17 35 269 |
| 1882-83 | 265 743 | 13 13 918 |
| 1883-84 | 712 954 | 37 65 462 |

Analysis of the Exports for 1883-84

| Province from which exported | Weight | Value | Countries to which exported | Weight | Value |
|------------------------------|----------------|------------------|-----------------------------|----------------|------------------|
| | Cwt | R | | Cwt | R |
| Bombay | 595 822 | 32 04 357 | United Kingdom | 24 211 | 1 10 576 |
| Sind | 15 | 85 | Belgium | 290 450 | 14 80 459 |
| Madras | 117 117 | 5 61 020 | France | 332 60 | 18 58 141 |
| | | | Italy | 15 913 | 82 113 |
| | | | Egypt | 32 750 | 1 73 116 |
| | | | Straits Settlements | 12 769 | 42 634 |
| | | | Other Countries | 4 259 | 18 423 |
| TOTAL | 712 954 | 37 65 462 | TOTAL | 712 954 | 37 65 462 |

Exports of Earth nuts from the French Ports in India

| YEARS | Quantity in bags | Value |
|---------|------------------|-----------|
| | Nos | R |
| 1880-81 | 233 533 | 14 39 340 |
| 1881-82 | 355 121 | 14 70 972 |
| 1882-83 | 412 415 | 16 18 659 |
| 1883-84 | 453 366 | 29 68 698 |

| Ground-nut Oil | | | | | | ARACHIS hypogæa. |
|-------------------------------------|---------------------|-----------|--------------------------------|---------------------|-----------|---------------------|
| Analysis of the Exports for 1883 84 | | | | | | |
| Ports from which exported | Quantity in bags | Value | Countries to which exported | Quantity in bags | Value | |
| | Nos | R | | Nos | R | |
| Pondicherry | 450 170 | 29 58 176 | United Kingdom | 43 906 | 2 88 949 | |
| Karikal | 3 196 | 10 522 | France | 403 964 | 26 59 845 | |
| | | | Reunion | 0 | 329 | |
| | | | Straits Settlements | 5 446 | 19 575 | |
| TOTAL | 453 366 | 29 68 698 | TOTAL | 453 366 | 29 68 698 | |

Accepting a mean between the discrepancies of the published figures of exports from British India and of those of the imports from British India into other countries we learn that the trade in ground nuts has developed from 20 000 cwts in 1875 76 to 700 000 cwts in 1883 84. The above tables show that the United Kingdom is mainly supplied from French India while the bulk of the British India exports are consigned to France and Belgium. Both in British and in French India the ground nut trade has thus developed with marvellous rapidity and this is doubtless due in a large measure to the action taken by the Government of India in the Resolution quoted above.

The following extract reporting the condition of the Pondicherry trade during May 1884 will be found interesting. The ground nut trade between Pondicherry and France is in full swing and has been so since the month of February. The South Indian Railway Company has been running special trains with nuts from Punrooty to Pondicherry every day during the past nine weeks and will probably continue to do so for two or three months longer. The ground nut trade is the most important in the chief town of the French Settlements in India. Three ships are loading nuts in the Pondicherry Roads and more are expected. The European and Native merchants are fully engaged in this trade for at least six months in the year and to facilitate shipments of nuts the South India Railway has laid down a railway line from the Pondicherry railway station to the pier so that the bags are shipped off as fast as they come in from the interior. Coolies find ample employment during the present season and the price of labour is high. The European merchants in the port have entered heart and soul into the enterprise and it is surprising how the South Arcot districts can produce such an immense quantity of nuts (*Madras Standard* quoted in the *Tropical Agriculturist* III 830).

The oil known as *gora tel* (*górâ tîl*) or sweet oil of the Indian bazars is obtained from a mixture of safflower, sesamum and ground nut seed.

Chemical Composition of Ground nut Oil

The oil consists of the glycerides of four different fatty acids the common *Oleic acid* $C_{18}H_{34}O_2$ —that is to say its glycerin compound is the chief constituent of Arachis oil. *Hypogæic acid* $C_{18}H_{30}O_2$ has been pointed out by Gossmann and Scheven (1854) as a new acid whereas it is thought by other chemists to agree with one of the fatty acids obtained from whale oil. The melting point of this acid from Arachis oil is 34° to 35° C. The third acid afforded by the oil is ordinary *Palmitic acid* $C_{16}H_{32}O_2$. The fourth constituent has also been met with among the fatty acids of butter and olive oil and according to Oudemans (1866) in the

**ARACHIS
hypogæa****Ground Nut**

tallow of *Nephelium lappaceum*, *L* an Indian plant of the Order Sapin daceæ

When ground nut oil is treated with hyponitric acid which may be most conveniently evolved by heating nitric acid with a little starch a solid mass is obtained which yields by crystallization from alcohol *Elaeidic* and *Gardinic* acids the former isomeric with oleic the latter with hypogæic acid (*Pharm by Fluck & Hanb p 187*)

MEDICINE
Oil
1265
Ointment
and
Plasters
1266

Medicine—*Arachis* oil forms a good substitute in pharmacy for olive oil It has now almost entirely superseded that of olive oil in India both for pharmaceutical and other purposes It is well adapted for the preparation of ointments and plasters **Dr Dymock** says that at the Government Medical Store Dépôt of Bombay the oil is expressed for pharmaceutical purposes to the extent of about 6000 lbs a year It is used as a substitute for olive oil For a good plaster 90 lbs of the oil take 41 lbs of oxide of lead

§ The oil is hardly known in South India We use gingelly (*Sesamum*) oil in our dispensaries for olive oil The ground nuts are largely eaten by natives in the Madras Presidency (*Deputy Surgeon General G Bidie C I E Madras*)

Oil of *Arachis* appears to me to be a very efficient substitute for olive oil in pharmacy and is fully as useful (*Surgeon Major H W E Catham Ahmadnagar*) Useful in catarrh of the bladder (*Surgeon Major Joseph Parker M D Poona*) Ground nuts roasted are eaten freely by natives of South India They are said to be very bilious (*Honorary Surgeon P Kinsley Chicacole Madras*) The pod is largely grown in the sandy soil of the South Arcot District and is exported to France (*Surgeon General William Robert Cornish C I F Madras*)

1267

Indian Prices—The price of ground nuts in South India is generally Rs 15 to 19 per *candy* (= 5 cwts) but during the season of 1883 when every available bag was bought and shipped to France it rose to Rs 24 (*Trop Agri III 774 quoting Madras Mail*) In the Bombay market the price of the seeds ranges from Rs 28 to 30 per *candy* according as the supply is abundant or otherwise (*Dymock Mit Med W Ind 202*)

African Nuts
1268

African Trade—Ground nuts are also grown on the west coast of Africa and a large trade exists between Senegal and the Mediterranean ports The African trade has one very important advantage over the Indian trade in the fact that Genoa and Barcelona are only from fifteen to twenty days distant by steamer from Senegal The African nuts can accordingly be landed in a far better condition than the Indian The yield of oil is stated to be from 42 to 50 per cent The *Pharmacographia* (p 187) says The pods are exported on an immense and ever increasing scale from the west coast of Africa From this region not less than 66 millions of kilogrammes value 26 millions of francs (£1 040 000) were imported in 1867 almost exclusively into Marseilles From the French possessions on the Senegal 24 millions of kilogrammes were exported in 1876 One of the learned authors of the *Pharmacographia* regards Africa as the probable home of the ground nut but most botanists are of opinion as already stated that it is more likely to have been originally a native of Brazil It is nowhere met with in a wild condition at the present day

FOOD
1269

Food—It produces the well known ground nut so called because the pod attains maturity underground

In India the nuts are sold in the bazars or by the street hawkers either parched with the shell on and put up in paper packets or shelled and roasted in oil They are eaten by natives of all classes especially in South India In Bombay they are a favourite food of the Hindus during

A 1269

The Araliaceæ.

ARALIACEÆ.

certain fasts They are occasionally seen roasted in shell as a dessert on the European table and are eaten with salt Hand shelled nuts are also sometimes made into confectionery The roasted seeds may be used as a substitute for chocolate According to Dr Davey they abound with starch as well as oil a large proportion of albuminous matter and in no other instance had he found so great a quantity of starch mixed with oil

Chemical Composition of the Meal — Dr Muter after giving the following analysis of ground nut meal urges its more general use as an important article of food —

| | |
|---------------------------------------|-----|
| Moisture | 96 |
| Fatty matter | 118 |
| Nitrogenous compounds (flesh formers) | 319 |
| Sugar starch &c | 378 |
| Fibre | 43 |
| Ash | 46 |

TOTAL 1000

From this analysis it is evident he observes that the residue from them after the expression of the oil far exceeds that of peas and is even richer than lentils in flesh forming constituents while it contains more fat and more phosphoric acid than either of them On these grounds we are justified in urging the adoption of the ground nut meal as a source of food it being superior in richness of all important constituents to any other vegetable products of a similar nature Although in the raw state it possesses a somewhat harsh odour similar to that of lentils this flavour entirely passes off in cooking and when properly prepared it has a very agreeable flavour

This seed is held in such estimation for eating in the United States (where it is known as the pea nut) that flourishing sale stands are seen at almost every street corner of New York They are not much appreciated in England except by children

There are fully 550 000 bushels sold annually in the city of New York alone Previous to 1860 the product in the United States did not amount to more than 150 000 bushels and of this total nearly five sixths were from North Carolina Formerly it was largely imported into America now they are supplied by the home crops raised in Virginia and the Carolinas (*Tropical Agriculturist* P L Simmonds pp 403 4)

Cattle Food and Fodder — The leaves and branches of the plant are greedily eaten by cattle and form an excellent fodder The hay is very nutritious much increasing the milk of cows The cake holds a high reputation as a food upon which cattle rapidly fatten

ARALIA, Linn Gen Pl I 936

Aralia cachemirica, Dene Fl Br Ind II, 722 ARALIACEÆ

Vern.—*Banakhor churial* Pb

Habitat.—A rank plant growing in the basins of the Jhelum and the Chenab

Fodder —Eaten by goats

ARALIACEÆ

Trees or shrubs very rarely herbs sometimes scandent or scandent when young and finally self supporting not rarely prickly *Leaves*

A. 1275

Ground nut
Meal
1270

CATTLE
FOOD
Cake
1271
FODDER
1272
1273

FODDER.
1274

1275

ARALIACEÆ.**Analysis of the Araliaceæ**

alternate the uppermost rarely sub-opposite long petioled large simple or compound *stipules* adnate to the petiole sometimes in conspicuous or 0
Flowers regular small sometimes polygamous in umbels racemes or paniced heads bracts and bracteoles small or conspicuous pedicels continuous with the base of the calyx or there jointed *Calyx tube* adnate to the ovary limb truncate obsolete or with smallteeth *Petals* 5 rarely 6 7 or many valvate or subimbricate expanding or deciduous in a cap *Stamens* as many as and alternate with the petals (very many in *Tupī danthus*) inserted round an epigynous disc *Ovary* inferior 2 celled or cells as many as the stamens (in *Arthrophyllum* 1 celled) styles as many as the cells distinct or united ovules solitary and pendulous in each cell *Fruit* coriaceous or drupaceous usually small one or more cells sometimes suppressed *Seed* pendulous albumen uniform or ruminated embryo minute radicle next the hilum *Distrib*—Species 340 chiefly tropical and sub tropical a few in the cool temperate zones

SECTION I Araliæ *Petals* imbricated (but only lightly) *Pedicels* jointed

| | | |
|-------------------|-------------------|---------------------|
| Styles 2 5 free | Leaves compound | 1 Aralia |
| Styles 5 combined | | 2 Pentapanax |
| Styles 4 3 free | leaves pinnatifid | 3 Aralidium. |

SECTION II Panacæ *Petals* valvate *Albumen* uniform

* *Ovary* 2 celled

| | | |
|---------------------|--------------------|-----------------------|
| Pedicels jointed | Leaves decom pound | 3 * Panax |
| Pedicels continuous | Leaves digitate | 4 Acanthopanax |

** *Ovary* 4 10 celled

† *Umbels sessile on the back of the leaf*

| | | |
|---------------|--|--------------------|
| Leaves simple | | 5 Helwingia |
|---------------|--|--------------------|

†† *Pedicels jointed*

| | | |
|---------------------|--|--------------------|
| Leaves once pinnate | | 6 Polyscias |
|---------------------|--|--------------------|

††† *Pedicels continuous* *Leaves not pinnate*

| | | |
|---|--|-----------------------|
| Fruit angular the size of a pea | | 7 Heptapleurum |
| Fruit more than $\frac{1}{2}$ in long | | 8 Trevesia |
| Flower sessile embraced by 4 bracteoles | | 9 Brassaia |
| Leaves simple (except the lowermost) | | 10 Dendropanax |

SECTION III Hederæ *Petals* valvate *Albumen* ruminated

* *Ovary* 1 celled

| | | |
|-----------------------------|--|-------------------------|
| Leaves pinnate or undivided | | 11 Arthrophyllum |
|-----------------------------|--|-------------------------|

** *Ovary* 2 celled

| | | |
|---------------------|-----------------|--------------------------|
| Pedicels continuous | Styles distinct | 12 Heteropanax |
| Pedicels continuous | Styles combined | 13 Brassaiaopsia. |
| Pedicels jointed | Styles combined | 14 Macropanax |

*** *Ovary* 5 4 celled *styles combined*

† *Leaves simple lobed or pinnate*

| | | |
|---------------------|--|----------------------|
| Pedicels continuous | | 15 Hedera |
| Pedicels jointed | | 16 Hederopsis |

†† *Leaves digitate*

| | | |
|------|------------------|-------------------|
| Tree | Leaflets ciliate | 17 Gambles |
|------|------------------|-------------------|

The Arctostaphylos

ARCTOSTAPHYLOS
Uva UrsiSECTION IV *Plerandrea*. Petals valvate Stamens 20-50

Petals united falling off in a cap

18 *Tupidanthus*

(Flora of British India by Sir J. D. Hooker Vol II 720-21)

Distribution—In the Natural Order ARALIACEÆ there are in all 340 species referred to 38 genera they abound in both hemispheres but not beyond latitude 52°. They are particularly plentiful in the mountains of Mexico and New Grenada. They are rare in the parallel region of Europe and Asia. There are 54 species met with in India belonging to 19 genera. In the plains of India there are 12 species or 22.2 per cent ascending to 5000 feet 20 species or 37 per cent up to 10000 feet 18 species or 33.3 per cent and above 10000 feet 4 species or 7.4 per cent. These are distributed over India as follows in Eastern India 36 or 66.6 per cent in South India 7 or 13 per cent in West India nil and peculiar to North India 1 or 1.8 per cent. Besides these the following are met with in two or more of the four regions or divisions of India not including North India 3 or 5.5 per cent and including North India 7 or 13 per cent thus in North India there are in all 8 species one being endemic and the others of a wider distribution. From these figures the Indian ARALIACEÆ are shown to have their head quarters in the warm temperate and temperate regions of the eastern division while their entire absence from the western division is exceedingly remarkable. Dalzell and Gibson in their *Flora of Bombay* mention a plant which they call *Hedera Wallichiana* as met with at Moolus foot of the Rām Ghāt and other similar places but the *Flora of British India* takes no notice of this species. The authors of the *Bombay Flora* mention in addition 7 species of introduced Araliaceæ which do not seem to have succeeded very well most of them occurring in one garden only and others appear to have died out.

The Affinities of the Araliaceæ are with UMBELLIFERÆ (with which they have in fact been combined by Baillon) with AMYLIDÆ and with CAPRIFOLIACEÆ. They are also closely connected to CORNÆ which in fact only differ in their drupaceous fruit and opposite leaves.

Properties and Uses—The family contains few species of any great importance to man. The small tree *Fatsia papyrifera* a native of the Island of Formosa yields the rice paper of China. The young shoots of a species of *Helwingia* are eaten in Japan while *Panax Ginseng* affords the celebrated medicine *Ginseng* famed as a tonic and aphrodisiac in the east. This is regarded by the Chinese as the most potent of restoratives but to the European practitioner its remedial value is regarded as entirely overrated. The leaves of the Iv (*Hedera Helix*) have from remote antiquity enjoyed the reputation of possessing remedial virtues especially as a dressing for ulcers and to destroy vermin on the body. For this purpose an oil medicated with the Iv was used.

ARAUCARIA, Juss Gen Pl, III 437

Araucaria Cunninghamii, Ait CONIFERÆ

Habitat—A large and handsome evergreen tree of Australia (Queensland) occasionally planted for ornamental purposes in Calcutta.

Structure of the Wood—Soft light yellow perishable.

Several other species are also occasionally met with in Indian gardens.

ARCTOSTAPHYLOS, Adans Gen Pl, II, 581

Arctostaphylos Uva Ursi, Spreng, ERICACEÆ

Syn.—ARBUTUS UVA URSI Linn

1276

1277

1278

1279

TIMBER
1280

1281

**ARDISIA
humilis****The Ardisia****MEDICINE**
Leaves
1282

Habitat.—A native of North America Europe and Asia
Medicine—The leaves are astringent and diuretic They are imported and sold by druggists

1283

ARDISIA, Swartz Gen Pl, II 645

A genus of shrubs or small trees belonging to the Natural Order MYRSINÆ comprising some 200 species native of tropical regions—45 being met with in India

Leaves petioled *Flowers* hermaphrodite in axillary or terminal simple or compound umbels or racemes *bracts* small deciduous *calyx* 5 (rarely 4 or 3) lobed persistent often somewhat enlarged in fruit *Corolla* red white or spotted 5 partite *segments* acute twisted to right in bud *Stamens* 5 *filaments* generally short *anthers* free ovate lanceolate acute *Ovary* globose narrowed upwards *style* cylindrical often much longer than the corolla lobes *stigma* punctiform *ovules* few *Fruit* globose or sub globose *Seeds* solitary globose *albumen* pitted or ruminated *embryo* horizontal

A genus in which many of the characters are exceptionally variable in certain species The generic name is derived from *apdis* a point in allusion to the acute petals The economic properties of the Indian plants are very imperfectly known

1284

Ardisia colorata, Roxb Fl Br Ind III 520 Fl Ind Ed Carey and Wall, II 271 A anceps, Wall Kurz For Fl II 107

Habitat—A shrub frequent in Cachar Assam to (?) Malacca

MEDICINE
Bark
1285

Medicine—Said to be the *dan* of Ceylon the bark of which is used as a febrifuge in fever and in diarrhœa and also applied externally to ulcers

1286

A crenata, Roxb Fl Br Ind III, 524

Syn—A CRENULATA Lodd A CRISPA A DC Kurz For Fl and Gamble Man Timb A GLANDULOSA Blume

Vern—Chamlani NEPAL Denyok LEPCHA

Habitat—A small erect shrub met with in Eastern Himâlaya from 4 000 to 8 000 feet and at Martaban at similar elevations (*Gamble*)

There seems to be some mistake regarding this species *Gamble* gives the above locality while the *Flora of British India* says it is a native of Penang Malacca and Singapore frequently distributed to Malaya China Japan It seems probable that *Gamble* is alluding to another species probably *A macrocarpa, Wall*

TIMBER
1287

Structure of the Wood—White moderately hard Very common under growth in the hill forests

1288

A humilis, Vahl Fl Br Ind, III 530

Syn—A SOLANACEA Roxb Fl Ind I 580 Wight Ic t 1212 Brandis For Fl 287 Kurz, For Fl II 110 A UMBELLATA Roth Roxb Fl Ind I 582 A LITORALIS Ait Kurz For Fl II 110, A POLYCEPHALA Wight Ill t 145 CLIMACANDRA LITTORALIS Kurz Jour As Soc 1871 Pt II 68

Vern—Banyâm, BENG, Bisi MAL (S P) Kudna URIYA Conda mayâru kahi nêrédu TEL Kantena mayarawa C P Bodina gidda MY SORE Gyengmaope BURM Balu-dan SINGH

Habitat—A small shrub met with throughout India ascending to altitude 5 000 feet Not met with in North India and Ceylon **Distrib**—Singapore Malaya and China

A 1288

Betel-nut Palm.

Dye—The red juice of the berries yields a good though unknown yellow dye

Structure of the Wood—Grey moderately hard used as fuel

Ardisia involucrata, *Kurz Fl Br Ind III 528*

Vern—*Denyok* LEPCHA

Habitat—A small shrub 3 to 6 feet with yellow corky bark altitude 2 000 to 5 000 feet in Sikkim

Structure of the Wood—Pinkish white with small scanty pores, and broad white wavy medullary rays

A. paniculata, *Roxb Fl Br Ind III, 519*

A small tree of the Khásia Hills and of Chittagong with handsome pink flowers The bark is thin greyish brown and the wood pinkish white with small pores radially disposed between the short broad wavy medullary rays

ARECA, *Linn Gen Pl III, 883*

A genus of PALMÆ belonging to the Tribe ARECÆ comprising some 24 species inhabitants of tropical Asia the Malaya and Australia

Stem tall slender attaining 80 feet or more with a diameter 12 15 inches; **leaves** terminal equally pinnatisect **petiole** on a long smooth green sheath **segments** lanceolate acuminate plicate with the margin recurved **base** broad with numerous parallel nerves **raches** angled and convex below with an acute margin above **Spadix** much branched pendulous appearing from the axil of the lowest leaf **Spathes** 3 or more the lower enclosing the spadix the upper generally bractiferous **Flowers** monœcious male and female on the same inflorescence female flowers solitary surrounded by numerous slender spikes of white fragrant male flowers **Male flowers** compressed small **Sepals** small imbricate free or connate **Petals** much larger obliquely lanceolate acute or acuminate **Stamens** 3 or 6 **filaments** short or obsolete **anthers** sagittate basifixed erect surrounding a minute rudiment of the ovary **Female flowers** much larger than the male **Sepals** orbicular concave broadly imbricate **Petals** much larger than the sepals valvate **Staminodia** minute or obsolete **Ovary** ovoid 3 locular **stigma** 3 sessile subulate erect or recurved **ovule** basilar erect **Fruit** orange coloured ovoid surrounded by the persistent coriaceous perianth **Seed** ovoid or sub-hemispherical truncated at the base **albumen** ruminated **embryo** basal

Areca is said to be the Latinised form of the Malayan name

Areca Catechu, *Linn PALMÆ*

THE ARECA OR BETEL NUT PALM, NOIX D'AREC, *Fr* AREKA NUSSE BETELNUSSE *Germ*

Vern—The nut *Supári supýári* HIND and *DUK Gua supári* BENG *Tambul ASS Póka-vakka vakka TEL Kamugu pakku kottai-pákku TAM Adike KAN, Sopári hopári phopal GUJ Supári MAR Adaka kavugu atakka MAL Puga-phalam gubak SANS Rófal or fowfal ARAB Gird chób popal PERS; Pwák pwakka SINGH Kwam thee beng kunsí kun kun thee-bin BURM Ah-búd dah ah pur rud dah AND*

Habitat—A native of Cochín China Malayan Peninsula and Islands Cultivated throughout tropical India in Bengal Assam Sylhet but will not grow in Mánipur and only indifferently in Cachar Burma, Siam In Western India below and above the Gháts Does not grow at any distance from the sea and will not succeed above 3 000 feet in altitude It flourishes however in the dry plateau of Mysore Kanara, and Malabar Most villages in Burma Bengal and South India have their clumps or avenues of betel palms The betel palm groves and pepper

ARECA Catechu

DYE
Yellow
1289
TIMBER
1290

TIMBER
1291

1292

1293

1294

**ARECA
Catechu****Betel-nut Palm.****CULTIVA
TION****1295**

betel leaf houses are perhaps the most characteristic features of the river banks in Sylhet and from these plantations the inhabitants of Cachar and Manipur obtain their supplies

Cultivation and Yield—*In Mysore*—There are two varieties of the Areca in Mysore the one bearing large and the other small nuts the produce of both kinds being nearly equal in value and quantity

The manner of Areca nut cultivation is different in different districts of Mysore The method followed in Channapatna is as follows The seed is ripe about the middle of January to February and is first planted in a nursery Trenches are dug and half filled up with sand on the surface of which is placed a row of the ripe nuts These are again covered with sand and rich black mould and are watered once in three days for four months The young palms are then transplanted to the garden which had been previously planted with rows of plantain trees at the distance of about four feet Two young Arecas are set in one hole between every two plantain trees When there is no rain the plants are watered every third day In the rainy season a trench is dug between every third row of trees to carry off superfluous water and to bring a supply from the reservoir when wanted At the end of three years the original plantain trees are removed and a row planted in the middle of each bed and kept up ever afterwards in order to preserve a coolness at the roots of the Areca The trees are five feet high in five years and begin to produce fruit The plantation requires no more watering except twice a month during the dry weather

The methods followed in other parts of Mysore differ in some respects from the one above but they agree in the essential point namely plantain trees are planted with the Areca palms and in most districts trenches are dug to carry off superfluous water The seedlings except in one district are first raised in a nursery and then transplanted Manure is used in some districts but watering is resorted to everywhere A rich black mould or a black soil containing calcareous nodules is preferred for Areca nut cultivation

The areca plantations in Mysore are interspersed with cocoanut lime jack and other trees which add to the shade and to the freshness of the soil (*Mysore Gazetteer Vol I pp 125 131*)

In Kolaba—In Kolaba the betel palm is grown in large numbers in cocoa nut plantations along the Alibag coast The nuts are buried two inches deep in loosened and levelled soil When the seedlings are a year old they are planted out in July and buried about two feet deep The soil is then enriched by a mixture of salt and *nachni* sometimes with the addition of cow dung No watering is required at first but after four months the plant is watered either daily or at an interval of one or two days If water is not stunted the betel palm yields nuts in its fifth or sixth year The tree yields twice or thrice a year about 250 nuts being an average yearly yield (*Bomb Gaz Vol XI pp 97 98*)

In Janjira or Shrivardha—In Janjira the betel palm is the most important of garden crops *Shrivardhan* betel nuts are known over the whole of the Bombay Presidency The seed nut is sown in February or March about half a foot deep and is carefully watered After about four months the plant appears and is watered every second day When it is four years old it is planted out about two feet and a half below the surface a foot and a quarter of the seedling being buried under the ground while a round trench of the same depth is left for the water When the tree is nine or ten years old it begins to bear fruit, the yearly yield varying from 25 to 400 nuts (*Bomb Gazetteer Vol XI 425*) This variety fetches relatively a much higher price in the market than any of the others

A. 1295

Betel-nut Palm.

ARECA
CatechuCULTIVA
TION

In Thana—The betel nuts are grown largely in Thana Bombay. The best nuts are carefully selected in October and dried in the sun. Unhusked nuts are considered the best for seed. They are planted in a well ploughed plot of land in pits three inches wide and three inches deep and at a distance apart of from six inches to a foot. For the first three months the young palm is watered at least every fourth day and afterwards every third day. When the plants are a year or a year and a half old they are fit for planting out. The selling price of young plants varies from 6 pies to 1 anna.

The betel palm usually grows in red soil but it flourishes best in sandy soil that remains moist for some time after the rains. Before planting the young palm the ground is ploughed levelled and weeded and a water channel is dug six inches deep and a foot and a half wide. Then pits nine inches deep and two feet wide are dug at least four feet apart nearly full of earth but not quite full so that water may lie in them. Where the soil allows plantains are grown in the beds to shade the young palms. Except during the rainy season when water is not wanted the young trees are watered every second day for the first five years and after that every third or fourth day. During the rains manure is sometimes given. (*Bombay Gazetteer XIII pt I 298 299*)

The cost of betel nut cultivation in Thana is calculated as follows.

An acre entirely given to betel palms would it is estimated hold 1 000 trees. The total cost of rearing 1 000 betel palms for five years—that is until they begin to yield—is about £127 13s including compound interest at 9 per cent. After five years a thousand trees are estimated to yield about £50 a year from which after taking £18 14s for watering assessment and wages and £11 9s 11½d as interest at the rate of 9 per cent on £1 7 13s there remains a net estimated profit of £19 16s 3½d or 15 52 per cent. (*Bombay Gazetteer Vol XIII pt I 301*)

In Ceylon—There are several varieties cultivated in Ceylon but they are not so good as the Indian ones and fetch the lowest price in the Bombay market. In poor soil the plant at first grows slowly. It can thrive among an undergrowth of weeds—in fact clean weeding is not probably beneficial to its growth. Neither tree nor fruit is liable to attacks by enemies of any kind. Young trees are continuously produced from nuts that have been allowed to drop and supply the place of those that have become worn out or unfruitful. Areca nut trees can be planted very closely 1 200 per acre being not at all too high an estimate. 12 000 cured nuts make on an average one cwt. At 300 per tree the average yearly yield would be about 30 cwt per acre.

The wholesale value at Galle or Colombo is usually Rs 8 per cwt giving Rs 240 per acre or leaving out Rs 100 for expenditure Rs 140 per acre as net profit.

At Madras and Bombay Ceylon nuts fetch about Rs 15 a cwt. The demand for areca nut is practically unlimited as hundreds of millions of people in China India &c use it. (*Notes by a Ceylon planter in Trop Agri II 791*)

In Bengal—The *supari* or betel nut is common in Eastern Bengal especially in Tipperah Backergunge and Dacca and its cultivation is very profitable to proprietors of land. It bears fruit in the eighth year and is most productive from that time to the sixteenth year when the produce falls off. The nuts are gathered in November. (*Administration Report of Bengal 1882 83 p 14*)

The betel nut cultivation is very extensive especially in the police circles of Tubkibagará and Hájiganj. A considerable trade in this article is carried on with Dacca Náránganj and Calcutta. The cultivators of the betel nut palm or *supari* (Areca Catechu) usually own a large

**ARECA
Catechu****Betel nut Palm.**

piece of ground slightly raised above the level of the surrounding country and surrounded by ditches. In the centre of this they build their dwellings and all around them they plant betel nut trees. An acre of land will obtain about 3000 trees. When first planted the betel nut requires to be protected from the sun for this purpose rows of *mádar* trees are planted between the lines of betel nut trees and the growth of jungle is encouraged. When the betel nut trees have grown strong and no longer require the shade the cultivators are too lazy and thoughtless to remove the jungle and the result is that whole parganas which were once fully cultivated are now covered with dense jungle in which even the betel nut trees cannot grow while thousands of the inhabitants have been swept away by cholera and malarious fever of a very virulent type. The unhealthiness of the neighbourhood of betel nut plantations is variously attributed to the dense jungle and undergrowth above mentioned to the exhalations from the trees and to the malarious gases generated by decomposing vegetable matter in the ditches surrounding the plantations. The betel nut trees grow to a height of about 60 feet and in some parganas they are cultivated to such an extent as to almost entirely exclude rice cultivation' (*Dr W W Hunter's Statistical Account of Bengal Vol VI pp 391 92*)

1296

Commerce—The betel nut palm is very largely cultivated on account of its seed (popularly called its nut). As stated in the previous pages the average yield per tree is about 300 fruits each of which contains one large seed about the size of a small hen's egg. The chief trade seems to centre around Bombay. Ceylon and Madras export their nuts to the Western Capital from which they are re-exported to the principal Asiatic centres and diffused by land all over India. Sumatra and Singapore also export large quantities of nuts to Bombay. The following extract from *Dr Dymock's Materia Medica of Western India* will be found useful as indicating the chief trade classes of areca nuts met with in Bombay—

The kinds of betel nut met with in Bombay are—

Gowai from Goa value R40 to R50 per candy of $5\frac{1}{4}$ cwt

Mangalore value R70 to R110 per candy

Rupasai from Alpai R60 to R80 per candy

Calcutta value R60 to R65 per candy

Asigree from Singapore value R60 to R70 per candy

Kanarese value R80 to R100 per candy of $5\frac{1}{4}$ cwt

Severdani (*Shrivardhan* Ed) value R4 $\frac{1}{2}$ to R4 $\frac{3}{4}$ per $\frac{1}{4}$ cwt

All these are known as white betel nut. The following kinds of red betel nut are met with—

Malabari value R70 to R80 per candy of $5\frac{1}{4}$ cwt

Kumpta 60 90

Marorkadi 80 85

Goa 65 90

Wasai from Bassein, value R6 to R8 per $\frac{1}{4}$ cwt.

Sewali value R5 per maund of $\frac{1}{4}$ cwt

Malwan value R60 to R65 per candy of $5\frac{1}{4}$ cwt

Vingorla " 60 " "

Calcutta , 50 60 "

| Betel-nut Trade | | | | | ARECA Catechu |
|--|------------|-----------|-----------|----------|------------------|
| The following are the imports and exports of Areca nut — <i>Foreign Trade by Sea.</i> | | | | | 1297 |
| YEARS | IMPORTS | | EXPORTS | | |
| | Quantity | Value | Quantity | Value | |
| | lb | R | lb | R | |
| 1879-80 | 21 585 601 | 20 57 059 | 2 287 900 | 2 57 508 | |
| 1880-81 | 27 973 690 | 23 29 395 | 967 005 | 96 930 | |
| 1881-82 | 24 918 002 | 0 19 918 | 605 484 | 53 545 | |
| 1882-83 | 23 693 555 | 21 68 061 | 948 165 | 77 199 | |
| 1883-84 | 30 390 094 | 34 06 458 | 466 7 2 | 52 417 | |

Details of Imports—1883-84

| Province into which imported | Quantity | Value | Countries whence imported | Quantity | Value |
|---------------------------------|-------------------|------------------|------------------------------|-------------------|------------------|
| | lb | R | | lb | R |
| Bengal | 6 393 388 | 4 64 858 | Ceylon | 9 900 147 | 14 39 963 |
| Bombay | 1 006 734 | 1 23 7 | Straits Settlements | 16 821 823 | 13 61 827 |
| Madras | 20 343 84 | 6 48 425 | Sumatra | 3 650 869 | 6 03 532 |
| British Burma | 2 647 588 | 1 69 948 | Other Countries | 18 155 | 1 136 |
| TOTAL | 30 390 994 | 34 06 458 | TOTAL | 30 390 994 | 34 06 458 |

Details of Exports—1883-84

| Province whence exported | Quantity | Value | Countries to which exported | Quantity | Value |
|-----------------------------|----------------|---------------|--------------------------------|----------------|---------------|
| | lb | R | | lb | R |
| Bengal | 158 172 | 13 171 | Mozambique | 47 964 | 5 878 |
| Bombay | 290 559 | 35 715 | Zanzibar | 171 419 | 20 156 |
| Madras | 17 991 | 3 531 | Mauritius | 114 061 | 11 931 |
| | | | South America | 15 269 | 1 431 |
| | | | Aden | 14,644 | 2 853 |
| | | | Arabia | 9 147 | 1 320 |
| | | | China—Hongkong | 29 488 | 2 643 |
| | | | Treaty Ports | 5 | 1 |
| | | | Maldives | 36,257 | 3,462 |
| | | | Other Countries | 28 468 | 2 742 |
| TOTAL | 466 722 | 52 417 | TOTAL | 466 722 | 52 417 |

NOTE —Of the betel nuts imported about 60,000 lb, valued at Rs 6 000 are re-exported annually to foreign countries

ARECA
Catechu

Betel nut Trade

Imports of Betel nuts in 1883-84 (Coasting Trade)

| PORTS FROM WHICH IMPORTED | INTO BENGAL | | INTO BOMBAY* | | INTO SIND | | INTO MADRAS | | INTO BRITISH BURMA | | TOTAL | |
|--|-------------|----------|--------------|-----------|-----------|--------|-------------|----------|--------------------|-----------|------------|-----------|
| | Quantity | Value | Quantity | Value | Quantity | Value | Quantity | Value | Quantity | Value | Quantity | Value |
| | Lb | R | Lb | R | Lb | R | Lb | R | Lb | R | Lb | R |
| <i>British Ports in other Presidencies</i> | | | | | | | | | | | | |
| From Bengal | 131 068 | 15 648 | 96 068 | 9 541 | 3 696 | 500 | 52 852 | 6 499 | 17 078 376 | 27 2 139 | 17 230 992 | 27 38 679 |
| Bombay | | | | | 451 704 | 67 050 | 42 085 | 2 577 | 38 | 13 | 625 555 | 85 888 |
| Sind | | | | | | | | | | | 6 604 | 646 |
| Madras | 716 147 | 60 633 | 5 984 703 | 646 | 128 350 | 15 771 | | | 24 853 | 3 813 | 6 854 253 | 6 45 106 |
| British Burma | 58 025 | 5 758 | 16 800 | 900 | | | | | | | 74 825 | 6 658 |
| Total | 905 240 | 91 039 | 6 104 235 | 5 66 976 | 584 010 | 83 921 | 95 537 | 9 076 | 17 103 267 | 27 25 965 | 24 792 289 | 34 76 977 |
| | 3 225 877 | 3 43 865 | 10 530 609 | 12 05 655 | 63 929 | 7 95 | 1 211 327 | 1 16 675 | 648 188 | 77 727 | 15 679 930 | 17 51 217 |
| <i>British Ports within the Presidency</i> | | | | | | | | | | | | |
| Indian Ports | | | | | | | | | | | | |
| British— | | | | | | | | | | | | |
| Portuguese— | | | | | | | | | | | | |
| From Diu | | | | | | | | | | | | |
| From Goa | | | | | | | | | | | | |
| | | | 560 | 45 | | | | | | | 560 | 45 |
| | | | 2 678 703 | 2 40 444 | | | | | | | 2 678 703 | 2 40 444 |
| Native— | | | | | | | | | | | | |
| From Cutch | | | 182 | 7 | 2 698 | 262 | | | | | 2 880 | 269 |
| Kattywar | | | 31 665 | 2 826 | | | | | | | 31 665 | 2 826 |
| Konkan | | | 252 701 | 44 146 | | | | | | | 252 791 | 44 146 |
| Travancore | | | 31 444 | 5 454 | | | | | | | 33 936 | 5 672 |
| Cochin | 1 680 | 153 | | | | | 812 | 65 | | | 196 | 18 |
| | | | | | | | 196 | 18 | | | | |
| Total | 1 680 | 153 | 2 995 345 | 2 92 922 | 2 698 | 262 | 1 008 | 83 | | | 3 000 731 | 2 93 420 |
| TOTAL OF ALL PORTS | 4,132 797 | 4,35 057 | 19,630 189 | 20 65 553 | 65,0 637 | 91 478 | 1 307 872 | 1 25 834 | 17 751 455 | 28 03 692 | 43 472 950 | 55 21 614 |

| Betel nut Trade. | | | | | ARECA Catechu |
|------------------------------|-----------|----------|-----------------------------|-----------|------------------|
| Frontier Trade by Land | | | | | |
| YEARS | IMPORTS | | EXPORTS | | |
| | Quantity | Value | Quantity | Value | |
| | lb | ₹ | lb | ₹ | |
| 1881-82 | 7 280 | 1 408 | 5 442 976 | 6 58 552 | |
| 1882-83 | 560 | 125 | 6 876 128 | 6 79 010 | |
| 1883-84 | 1 456 | 141 | 6 078 240 | 7 5 441 | |
| Details of Imports—1883-84 | | | | | |
| Province into which imported | Quantity | Value | Country whence imported | Quantity | Value |
| | lb | ₹ | | lb | ₹ |
| Bengal | 1 456 | 141 | Nepal | 1 456 | 141 |
| Details of Exports—1883-84 | | | | | |
| Province whence exported | Quantity | Value | Countries to which exported | Quantity | Value |
| | lb | ₹ | | lb | ₹ |
| Panjab | 5 824 | 873 | Nepal | 676 368 | 61 573 |
| N W P and Oudh | 20 432 | 3 759 | Bhutan | 246 624 | 21 216 |
| Bengal | 893 4 4 | 78 944 | Manipur | 363 104 | 38 512 |
| Assam | 394 016 | 39 607 | Upper Burma | 4 438 672 | 5 77 349 |
| British Burma | 4 758 544 | 6 29 258 | N Shan States | 2 81 456 | 41 379 |
| | | | Karennee | 30 464 | 7 875 |
| | | | Other countries | 41 552 | 4 537 |
| TOTAL | 6 078 240 | 7 52 441 | TOTAL | 6 078 240 | 7 52 441 |

Extract.—A decoction of the nut yields an inferior resinous extract known sometimes as Areca Catechu

The water in which areca nuts are boiled becomes discoloured and thick this on being inspissated forms *Kossa* or the catechu of the greatest astringency but the best catechu of a red or brown colour is obtained by boiling in fresh water nuts which have been previously boiled (*Baden Powell Panjab Products I 302*)

The ripe fruit is boiled for some hours in an earthen or a tinned copper vessel and the nuts together with the boiling water are poured over a basket The boiled water is caught in a tinned copper vessel and is allowed to thicken of itself or is thickened by boiling into a black very astringent catechu Sometimes these nuts are boiled a second time in

Decoction
1298

**ARECA
Catechu****Betel nut Palm.**

fresh water when the boiled water gives a yellowish brown catechu. The refuse after boiling is sticky and is used for varnishing wood and for healing wounds (*Bombay Gazetteer XIII pt I 300*).

No definite information can be obtained as to the extent of the manufacture of this form of catechu. It is apparently rarely if ever exported from India.

DYE
I299

Dye—The preparation of *pán* acting chemically upon the saliva colours it red. A decoction of the *nut* is used in dyeing and a kind of inferior catechu is prepared from it. With *tun* (*Cedrela Toona*) it is said to give a red dye. *Pán* is also used in Dinajpur as a subsidiary in red dyeing with *Morinda tinctoria* (*M Cann*).

TAN
I300

Tan—*Spons Encyclopædia* says: An astringent extract prepared from **Areca Catechu**, is said to contribute to commercial cutch if so it is a totally distinct product from the true catechu.

FIBRE
I301

Paper Material—The spathe which covers the flowering axis may be used for paper making and so also might the fibrous pericarp which is removed from the nut. The spathes are largely used in India for packing and in the preparation of small articles for personal use. (See **Domestic Uses**).

MEDICINE
Nuts
I302
Dentifrice.
I303

Medicine—Young nut is said to possess astringent properties and is prescribed in bowel complaints and bad ulcers. It contains a large proportion of tannic and gallic acids and hence its astringent property. The burnt nuts when powdered form an excellent dentifrice. According to **Dr J Shortt** the powdered nut in doses of 10 or 15 grains every three or four hours is useful in checking diarrhoea arising from debility. It has also been found very useful in urinary disorders and is reported to possess aphrodisiac properties. The dried nuts when chewed produce stimulant and exhilarant effects on the system.

Powder
I304

The powdered seeds have also long been held in some reputation as an anthelmintic for dogs and Areca has now been introduced into the *British Pharmacopæia* on account of its supposed efficacy in promoting the expulsion of the tape worm in the human subject. It is also reputed to be efficacious against round worm (*Ascaris lumbricoides*). **Dr Barclay** who appears to have been the first practitioner who called attention to the remedial value of the areca nut in the expulsion of tape worm administered it in powder in doses of from four to six drachms stirred up with milk (*Bentl & Trim Med Pl*). **Dr Waring** says: Anthelmintic virtues have been assigned to the nut but it can hardly have any claim to this character as amongst the Hindus and Burmese who use it habitually as a masticatory intestinal worms (*lumbrici*) are almost universally met with.

Juice
I305
Petioles as
splints
I306
Tincture
I307

The nut is regarded as a nervine tonic and emmenagogue and is used as an astringent lotion for the eyes. The juice of the young leaves mixed with oil is said to be used externally in lumbago. The dry expanded petioles may be used as ready made splints.

§ Is useful in checking the pyrosis of pregnancy. Control experiments made with tincture of catechu showed the superiority of the nut and would seem to demonstrate that this is not merely due to astringent action possibly its property as a nervine stimulant enhances its utility" (*Surgeon G King Madras*). Used as an astringent for bleeding gums native women employ it both internally and locally for stopping watery discharges from the vagina (*Assistant Surgeon Jaswant Rai Mool tan*). "Is very useful as a vermifuge in dogs. I have given half a nut powdered mixed with butter to terriers with remarkable effect (*Surgeon K D Ghose Khulna*). There are various kinds some are stimulant when chewed and their juice swallowed causing an agreeable sense of warmth generally felt in the ears but sometimes a disagreeable

Betel-nut Palm.

ARECA
Catechu

CHEMISTRY

sensation of constriction in the throat and chest with profuse flow of mucus Powder of roasted nuts forms a good tooth powder' (*Assistant Surgeon Shih Chunder Bhuttacharya Chanda Central Provinces*)

The powdered young bark is anthelmintic used for tape-worm useful in animals supposed to be the principal ingredient in Naldire's worm tablets (*Surgeon W D Stewart Cuttack*) It is a good anthelmintic and expels thread worms I have often given half a nut to a dog mixed up in butter with very good effect The worms are expelled after one or two doses (*Surgeon K D Ghose Binkura Bengal*) Is a good vermifuge for dogs in 3i doses (powdered) (*Surgeon Major F Byers Thomas Waltair Visigapatim*) Nut cut small and soaked in milk is a good vermifuge for dogs (*Surgeon Major P N Mukerji Cuttack Orissa*)

Very useful in worms in dogs and other domestic animals A piece kept in the mouth allays thirst on long marches in sandy deserts where water is scarce (*Surgeon H D Masani Kurrachee*) Most useful in the preparation of tooth powder The burnt nuts to be reduced to a fine powder and mixed with powdered chalk in the proportion of 3 of former to 1 of latter (*Dr S M Sircar Moorshedabad*) The young and undried nut is distinctly astringent when well dried under the sun the astringency becomes less and the softer portions become slightly sweetish in taste The young undried nuts possess something which when chewed in excess gives rise to temporary giddiness (*Surgeon D Basu Faridpur Bengal*)

Is a valuable vermifuge for dogs especially for round worms (*Surgeon George Cumberland Ross Delhi*)

Chemical Composition — We have exhausted the powder of the seeds previously dried at 100 C with ether and thereby obtained a colourless solution which after evaporation left an oily liquid concreting on cooling This fatty matter representing 14 per cent of the seed was thoroughly crystalline and melted at 39 C By saponification we obtained from it a crystalline fatty acid fusing at 41 C which may consequently be a mixture of lauric and myristic acids Some of the fatty matter was boiled with water the water on evaporation afforded an extremely small trace of tannin but no crystals which had catechin been present should have been left

The powdered seeds which had been treated with ether were then exhausted by cold spirit of wine (832) which afforded 14.77 per cent (reckoned on the original seeds) of a red amorphous tannic matter which after drying proved to be but little soluble in water whether cold or boiling Submitting to destructive distillation it afforded *Pyrocatechin* Its aqueous solution is not altered by ferrous sulphate unless an alkali is added when it assumes a violet hue with separation of a copious dark purplish precipitate On addition of a ferric salt in minute quantity to the aqueous solution of the tannic matter a fine green tint is produced quickly turning brown by a further addition of the test and violet by an alkali An abundant dark precipitate is also formed

The seeds having been exhausted by both ether and spirit of wine were treated with water which removed from them chiefly mucilage precipitable by alcohol The alcohol thus used afforded on filtration traces of an acid the examination of which was not pursued After exhaustion with ether spirit of wine and water a dark brown solution is got by digesting the residue in ammonia from this solution an acid throws down an abundant brown precipitate not soluble even in boiling alcohol We have not been able to obtain crystals from an aqueous decoction of the seeds, nor by exhausting them directly with boiling spirit of wine We have come

1308

A 1308

**ARECA
Catechu****Betel nut Palm**

therefore to the conclusion that *Catechin* (p 243) is not a constituent of areca nuts and that any extract if ever made from them must be essentially different to the *Catechu* of *Acacia* or of *Nauclea* and rather to be considered a kind of tannic matter of the nature of *Ratanhia red* or *Cinchona red*

By incinerating the powdered seeds 2.26 per cent were obtained of a brown ash which besides peroxide of iron contained phosphate of magnesium (*Fluck & Hanb Pharmacographia pp 670 71*)

**FOOD
I309**

Food—The nut is one of the indispensable ingredients which enter into the preparation of the *pan* or betel leaf which is chewed so universally by natives of all classes. The betel nut is often chewed by itself in small pieces and is sold in every bazar throughout India. It is said to stimulate digestion. Small pieces of the prepared betel nut are rolled up with a little lime catechu cardamoms cloves and even rose water within the betel pepper leaf. This combination forms the *pan* which gives to the lips and teeth the red hue which the natives admire. In the course of time it has the effect however of colouring the teeth black at least along the edges thus destroying the appearance of the teeth. The chewing of *pan* is supposed to prevent dysentery. It is said to dispel nausea excite appetite and strengthen the stomach. Besides being used as an article of luxury it is a kind of ceremonial which regulates the intercourse of the more polished classes of the East. When any person of consideration visits another after the first salutations betel is presented to omit it on the one part would be considered neglect and its rejection would be judged an affront on the other (*McCulloch's Dictionary of Commerce and Commercial Navigation*)

Panjab nuts**I310**

Assam

I311

Manipur

I312

Bengal

I313

Bombay

I314

Trade forms

of Supari

Phulbari

I315

Tarahdi

I316

Chikni

I317

Lavanga

churi

I318

Pandhri

I319

Dagdi

I320

Preparation of the Nut—After the nuts are husked they are boiled till soft and taken out and sliced the slices are rubbed with the insipidated water in which the nuts were boiled which became impregnated with the astringent principle contained in the nuts the slices are then dried in the sun and in this condition sent to market. Instead of being sliced and boiled the nuts are also largely sold entire (*Baden Powell*). In Manipur they are sold in the streets with the husk neatly opened up like a fringe to show that the nuts are fresh. In the Bombay and Mysore *Gazetteers* interesting details are given regarding the methods of preparing the nuts for the market. In Thana the growers sell the fruit wholesale to a tribe called Vanis who by different treatment prepare six classes of nuts. To prepare *phulbari supari* or those with flower like fissures the nuts are gathered when yellow but not quite ripe. The husk is stripped off and the kernels are boiled in milk or water in an earthen or tinned copper vessel. When the nut grows red and the water or milk thickens like starch the boiled nuts are removed and dried in the sun for seven or eight days. The red *tambdi* betel nuts are prepared by boiling ripe fruits stripped of its husk in milk or water with a small quantity of pounded *kath* lime and betel leaves. As soon as the boiling is over the nuts and boiling milk or water are removed in a basket with a copper vessel under it to catch the droppings. To make *chikni* or tough betel nut the nuts are gathered when they are beginning to ripen and when the boiling is over the catechu like substance left on boiling is rubbed on the nuts when they are dried in the sun. This process is repeated until the nuts grow dark red. To make *lavangachuri* or clove-like betel nuts the kernels of tender fruits are cut into clove like bits and after boiling in water are dried in the sun. *Pandhri* or white betel nut is made by boiling the ripe fruit with its husk and afterwards drying in the sun till the husks are easily removed. To prepare *dagdi* or strong nut the fruit is gathered when ripened into hardness and after stripping it of the husk it is boiled

The Arenaria.

ARENARIA
holosteoides.

and dried in the sun To make *kapkadi* or cut betel-nut, the kernels are cut out of the nut when tender and dried in the sun without being boiled or soaked in water (*Bombay Gazetteer Vol XIII Pt I pp 299 300*)

In Mysore after removing the husk the nuts are boiled in water then cut into pieces and dried in the sun or they are first cut into pieces then boiled in water with cutch leaves of *Piper betel* and afterwards dried in the sun when they are fit for sale (*Mysore Gazetteer Vol I pp 126 127*)

Structure of the Wood—The areca nut is one of the most elegant of Indian palms with thin straight stem and crown of leaves looking like an arrow stuck in the ground It often attains 100 feet in height with a slender cylindrical annulate stem the inner part of which is generally hollow The vascular bundles are brown forming a hard rind on the outside of the stem Weight 57 lbs per cubic foot

Used for furniture trenails bows spear handles and for scaffolding poles in Ceylon In the Bombay Presidency The trunk of the betel palm is used as roof rafters for the poorer class of houses and for building marriage booths it is slit into slight sticks for wattle and daub partition walls and it is hollowed into water channels In some places it is used for spear handles (*Bombay Gazetteer Vol XV Pt I 300*)

Domestic Uses—The soft white fibrous flower sheath called *kácholi* or *po* is made in skull caps small umbrellas and dishes and the coarser leaf sheath called *viri* or *virhati* is made into cups plates and bags for holding plantains sweet meats and fish (*Bombay Gazetteer Vol XV Pt I p 300*)

The nut is used in many religious ceremonies and forms one of the chief articles of trade in Kanara (*Bomb Gaz Vol XV, Pt I p 62*)

Areca concinna, Thw En Ceyl Pl 328

Vern—*Laina terri* SINGH

Habitat—A small palm indigenous to Ceylon

Food—The natives eat the nuts as a substitute for the ordinary betel nuts it is never cultivated (*Dr Trimen*)

A. gracilis, Roxb

Syn—PINANGA GRACILIS Kunt

Vern—*Gua supari ramgua* BENG Khur LEPCHA Ranga ASS

Habitat—A slender stemmed palm often gregarious found in under growths of damp forests in Sikkim Assam Eastern Bengal and Burma

Structure of the Wood—It is used for native huts and roofing in Assam The outer portion is hard and closely packed with fibrovascular bundles the inner is soft as the cane shrinks in drying

ARENARIA, Linn Gen Pl, I, 149**Arenaria holosteoides, Edge Fl Br Ind I, 241 CARYOPHYLLÆ**

Vern—*Kakua gandial* PB ; *Chiki* LADAK

Habitat—A herb found in the Western Hímálaya and Western Tibet from Kumaon to Kashmír, altitude 7,000 to 12,000 feet and distributed into Afghánistan

Food—Used as a vegetable in Chumba and Ladák.

Kapkadi.
I321

Mysore nuts
I322

TIMBER
I323

DOMESTIC
Caps
I324
Umbrellas
I325
Dishes.
I326
Cups
I327
Bags
I328

FOOD
I329

I330

TIMBER
I331

I332

FOOD
I333

A I333

**ARENGA
saccharifera****The Malacca Sago Palm.****1334****ARENGA, Labill Gen Pl III, 917**

An erect palm with simple stem often 40 feet in height. Leaves terminal and seen at a distance somewhat resembling the crown of leaves of the date palm except that they are longer petiole thick leaflets sub-opposite 3 5 feet long ensiform the base dilated into 1 or 2 ears upper half dentate serrate apex somewhat obliquely cut white beneath green above. Flowers unisexual monœcious numerous sessile bracts 2 or more to each flower imbricate in bud spadices several 6 10 feet long coming from among the leaves and developing downwards the tree dying when the last and lowest spadix is ripe. Male flowers with 3 sepals concave rounded fleshy petals 3 longer than the sepals valvate purple outside yellow within Stamens numerous filaments shorter than the anthers no trace of pistil Female flowers with petals not much longer than sepals stamens none ovary large 3 lobed smooth 3 celled with a single erect ovule stigma sessile conical Fruit the size of an apple depressed at the top 3 celled with a single seed in each cell

1335**Arenga saccharifera, Labill Kurz, For Fl Burm, II, 533
Brandis For Fl 550 PALMÆ****THE SAGO PALM of Malacca and the Malaya**

Syn—SAGUERUS RUMPHII Roxb Fl Ind Ed C B C 669 BORASSUS GOMUTUS Lour GOMUTUS SACCCHARIFERA Spr

Vern—Tawng ong tawng ong BURM Eju (fibre) MALAYA Gumuts (tree) kobong MALACCA

Habitat—A Malayan tree generally cultivated in India but said by Kurz to be wild in Burma also mentioned by Hooker and Thomson as found wild in Orissa One or two trees were observed growing along with *Caryota urens* on the mountains of North Manipur apparently wild (especially in the Kabu valley)

Properties and Uses—**FIBRE
1336**

Fibre—At the base of the petiole is found a beautiful black horse-hair like fibre known as the Eju or Comuta Fibre Within the sheaths is also found a layer of reticulated fibres which is said to be in great demand in China being applied like oakum in caulking the seams of ships It is also largely used as tinder for kindling fires The Manipuris value very much this reticulated fibre which they use as also that obtained from *Caryota urens*, for making mechanical filters A bundle of these black reticulated fibres tied firmly together is placed in the bottom of a perforated vessel the water percolating through is cleansed of mechanical impurities The fibre has a high reputation for lasting under water Mueller (*Extra Tropical Plants*) says The black fibres of the leaf stalks are adapted for cables and ropes intended to resist wet very long Roxburgh (*Fl Ind Ed C B C 669*) remarks "I cannot avoid recommending to every one who possesses lands particularly such as are low and near the coasts of India to extend the cultivation of this plant as much as possible The palm wine itself and the sugar it yields the black fibres for cables and cordage and the pith for sago independent of many other uses are objects of very great importance particularly to the first maritime power in the world which is in a great measure dependent on foreign states for hemp the chief material of which cordage is made in Europe" Simmonds writing of this palm says It furnishes a highly valuable black fibrous substance Ejuo fibre superior in quality cheapness and durability to that obtained from the husk of the cocoanut and renowned for its power of resisting wet

**FOOD
Sago
1337**

Food.—THE SAGO from the interior of the stem although inferior in flavour to that obtained from the true sago palm is nevertheless an important article of food It is the source of the Java sago and although chiefly cultivated for its sap from which a wine and also sugar

A. 1337

Arenga Sugar

ARENCA
saccharifera.

and vinegar are prepared the sago is an important article of food throughout the Malaya. After the tree ceases to yield sap or toddy, the stem furnishes the starchy substance. It is said that a single tree will often yield 150 to 200 pounds. *Arenga* is doubtless the source of a good deal of the sago of commerce (*Bentl & Trim*). It is generally stated that the trees which produce female spadices yield the best sago and scarcely any sap whereas the male spadix gives a copious flow of the sap from which toddy wine sugar and vinegar are made.

The Mampuris eat the young and blanched leaf stalks as a pickle. The young kernels are made with syrup into preserves (*Mueller*).

The Sap—The following interesting account of the process of extraction of the sap is taken from *Simmonds Tropical Agriculture* (p. 248). One of the spadices is on the first appearance of fruit beaten on three successive days with a small stick with the view of determining the sap to the wounded part. The spadix is then cut a little way from its root (base) and the liquor which pours out is received in pots of earthenware in bamboos or other vessels. The Gomuti palm is fit to yield toddy when nine or ten years old and continues to yield it for two years at the average rate of three quarts a day.

When newly drawn the liquor is clear and in taste resembles fresh *must*. In a very short time it becomes turbid whitish and somewhat acid and quickly runs into the vinous fermentation acquiring an intoxicating quality. In this state great quantities are consumed, a still larger quantity is applied to the purpose of yielding sugar. With this view the liquor is boiled to a syrup and thrown out to cool in small vessels the form of which it takes and in this shape it is sold in the markets. This sugar is of a dark colour and greasy consistence with a peculiar flavour it is the only sugar used by the native population. The wine of this palm is also used by the Chinese residing in the Indian islands in the preparation of the celebrated Batavian rack.

In Malacca the Gomuti there termed Kabong is principally cultivated for the juice which it yields for the manufacture of sugar. Like the coconut palm it comes into bearing after the seventh year. It produces two kinds of mayams or spadices male and female. The female spadix yields fruit but no juice and the male *vice versa*. Some trees will produce five or six female spadices before they yield a single male one and such trees are considered unprofitable by the toddy collectors but it is said that in this case they yield sago equal in quality though not in quantity to the *Cycas circinnias* though it is not always put to such a requisition by the natives. Others will produce only one or two female spadices and the rest male from each of which the quantity of juice extracted is the same as that obtained from the coconut spadices. A single tree will yield in one day sufficient juice for the manufacture of five bundles of jaggery valued at two cents each. The number of *mayams* shooting out at any one time may be averaged at two although three is not an uncommon case. When other occupation or sickness prevents the owner from manufacturing jaggery the juice is put into a jar where in a few days it is converted into excellent vinegar equal in strength to that produced by the vinous fermentation of Europe. Each *mayam* will yield toddy for at least three months often for five and fresh mayams make their appearance before the old ones are exhausted, in this way a tree is kept in a state of productiveness for a number of years the first *mayam* opening at the top of the stem the next lower down and so on until at last it yields one at the bottom of the trunk with which the tree terminates its existence.

Dr J E de Vry states that this palm contains a great proportion

Leaves
I338
Kernels
I339
Preserves
I340
SAP
Wine
I341
Sugar
I342
Vinegar
I343

A. I343

**ARENGA
saccharifera.****Arenga Sugar****SAP**

of cane-sugar although the natives in Java extract it by a very rude and entirely primitive mode. He thus describes the process which differs little from that pursued for obtaining sap and sugar from other palms —

As soon as the palm begins to blossom they cut off the part of the stem that bears the flower. There flows from the cut a sap containing sugar which they collect in tubes made of bamboo cane previously exposed to smoke in order to prevent the fermentation of the juice which without this precaution would take place very quickly under the double influence of the heat of the climate and the presence of a nitrogenous matter.

The juice thus obtained is immediately poured into shallow iron basins heated by fire and is thickened by evaporation till a drop falling on a cold surface solidifies. This degree of concentration attained the contents of the kettle are put in forms of great prismatic lozenges. Several thousand pounds of sugar are thus obtained yearly. I have collected some of the sap in a clean glass bottle and I found that the unaltered juice does not contain any glucose but a nitrogenous matter which by the heat of the climate quickly converts a part of the cane-sugar into glucose. In order to prove without employing any artificial means that the juice exuding from the tree contains pure cane sugar I collected a sample directly in alcohol. The nitrogenous principle is thus eliminated by coagulation. A mixture of equal parts of juice and alcohol has been after filtration evaporated on the sand bath to the consistence of syrup. I brought this syrup with me on returning from Java and during the voyage it became solid presenting very fine and well defined crystals of cane sugar immediately recognised as such by all the experts. At the Congress of Giessen I spoke of the preparation of sugar from palms as the only rational mode of obtaining sugar in the future basing my opinion on the following grounds. Sugar by itself being only composed in a state of purity of carbon hydrogen and oxygen does not take anything from the soil but the plants now mainly cultivated for extracting sugar *viz* the *Beta vulgaris* and the *Saccharum officinarum* require for their development a great amount of substances from the soil in which they grow whence it follows that their culture exhausts the soil. But this is not the only evil what is worse is that the space now occupied by beet roots in Europe and by sugar cane between the tropics might and ought to serve for the culture of wheat or of forage in Europe and for rice under the tropics and it is my opinion that considering the increase of population the time is not far distant when it will be absolutely necessary to devote to the culture of wheat or rice the lands now employed for beet root or cane. While the cane and beet root require a soil fit for cereals the Arenga palm prospers on soils entirely unfit for their culture — so unfit indeed that one might try in vain to grow on them rice or cereals. The Arenga palm thrives in the profound valleys of Java and in some parts of the island extends from the shores of the sea to the interior where the tree is found in groups and it is very possible to make rich plantations of that fine tree. There is one drawback but not a very serious one the tree must be eleven or twelve years old before it will yield sugar. When however it commences the operation can be repeated during several years and the preparation of the sugar becomes a continuous industry and not an interrupted one as it is now. According to my average a field of thirty ares ($\frac{1}{2}$ acre) planted with those trees should produce yearly 2400 kilogrammes of sugar in a soil quite unfit for any other kind of culture.

**TIMBER
1344**

Structure of the Wood.— The trunk of the dead palm becomes soon hollow and furnishes very durable underground water pipes also good for troughs or channels for water. (*Kurz*)

The Argemone.

ARGEMONE.

ARGANIA, *Roem et Schult Gen Pl, II 656*

A genus closely allied to *SIDEROXYLON* containing only one species, the Argan tree of Morocco sometimes attaining a height of 70 feet but generally much lower with wide-spreading branches often covering a space of 220 feet.

I345

Argania Sideroxylon, *R & S Linn Jour, Vol XVI, 563*

I346

SAPOTACEÆ

Habitat—This is the Argan tree of Morocco which is found growing gregariously in forests in the Atlas Mountains in its wild state over but a very limited area

Properties and Uses—

Oil—An oil resembling olive oil is extracted from the seeds. It has a clear light brown colour and a rancid odour and flavour. It is an important domestic oil among the Moors and to a certain extent finds its way to India

OIL
I347

Food and Fodder—The fruit of the size of a small plum is used for feeding cattle the skin and pulp being much relished. The leaves are also given as fodder

FOOD
Fruits.
I348
FODDER
Leaves
I349

There seems no reason why this exceedingly valuable tree might not be successfully introduced into India. The attempt to do so appears however to have failed. In the *Kew Report* for 1879 page 12 an interesting account of this tree is given from which the following has been extracted—

The husk of the fruit is greatly valued for cattle food while the seed kernel is the source from which an excellent oil is extracted

At different times the seed has been procured and distributed to various colonies where however its slow growth has led to disappointment. In 1870 a supply was obtained through the kindness of Mr C H Carstensen H B M Vice Consul Mogador

Amongst other places the Botanic Garden at Saharanpore was supplied where however the plant though probably well suited for North West India does not appear to have survived (*See also Kew Report 1882 p 17*)

ARGEMONE, *Linn Gen Pl, I 2*

I350

A small American genus (six species) belonging to the Natural Order PAPAVERACEÆ one species naturalized in India

An erect prickly annual juice yellow. *Flowers* bright yellow *sepals* 2 3 *petals* 4-6 *Stamens* indefinite *Ovary* 1-celled *style* very short *stigma* 4 7 lobed *ovules* many on 4 7 parietal placentas *Capsule* short dehiscent at the top by short valves that alternate with the stigmas and placentas *Seeds* many

The Indian representative of this genus has now passed completely over the plains of India, ascending the hills to about 2 000 feet in altitude and but for its known history no one could hesitate in pronouncing it wild and indigenous. It is however one of the numerous introduced plants which have made India their home it has even received by adaptation vernacular names known to oriental literature before the introduction of the plant. There are many illustrations of this nature, *i e*, names being given by modern usage to plants which only very fancifully resemble the originals. Thus the names for the species of *Tamarix* are universally given to the introduced *Casuarina*.

The name Argemone is derived from the name of a small ulcer in the eye, for which this was supposed to be a specific

**ARGEMONE
mexicana****The Mexican Poppy****I351****Argemone mexicana, Linn, Fl Br Ind, I, 117 PAPAVERACEÆ****THE MEXICAN OR PRICKLY POPPY**

Vern—*Baro shalkanta sāl kāntā* BENG *Gokhula janum SANTAL* *Bhar bhand piladhutura farangi dhuturā ujar kāntā shāl kāntā* HIND; *Bharbhurwa karwah kāntēla* N-W P *Kandsari sialkāntā bhatmī* *satya nasa bherband katci bhat kāteya* PB *Srigāla kāntā brahmadandī* SANS; *Farangi dhatura bharamdandī dārūrī pīla-dhatūrā* DUK *Darudī* GUJ *Firangi dhotra darūrī pīvala dhotra kāntē dhotra* MAR *Birama dandū kurukkum ckeḍi* TAM *Brahma dandī chettu* TEL *Datturī datturī gidda* KAN *Brahma-danti* MAL; *Kāntā kusham* URIYA *Khyaa* BURM

Datturī or *Datherī gida* is the Kanarese name under which this plant is generally known in Mysore Bangalore and Bellary but this name is liable to be confounded with that of *Datura alba* in several other languages as has been pointed out by **Moodeen Sheriff**

Habitat—A spiny, herbaceous annual introduced into India within historic times common everywhere from Bengal to the Panjāb on road sides and waste places self sown and appearing in the cold season The *Bombay Gazetteer* (Vol III 206) says that in the Panch Mahāls this plant is as common here as elsewhere and not the least like a foreigner

SAP**THE SAP****I352**

The milky sap on drying forms a substance resembling opium

OIL**THE OIL****I353**

The seeds yield a pale yellow clear limpid oil used in lamps and medicinally in ulcers and eruptions In Bengal and more or less throughout India the seed is collected and pressed for the oil which is yielded as copiously as that from mustard seed The drawn oil is allowed to stand for a few days to deposit a whitish matter after which it remains clear and bright (*Spons Encycl*) According to **M Lépine** this oil might with advantage be used in the arts (*Journ de Pharm Fuillet 1861 p 16*) **Oharbonnier** describes it as of a light yellow colour limpid transparent retaining its fluidity at 5 C of a nauseous odour and slightly acrid taste which, however is not very disagreeable It dries on exposure to the air but is entirely soluble in 5 or 6 measures of alcohol at 32.2 C **Flückiger** has not found this statement to be correct however He says it has the specific gravity of 919 at 16.5 C and remains clear at —6 C but on exposure dries slowly and completely **Dr Dymock** informs me that the oil changes to a deep red colour It may be readily separated by means of carbon disulphide It is thought that it is likely to come into great demand as an oil for painting if so India could supply a practically unlimited amount as in many parts of the country the plant is so abundant as to have become a source of anxiety to the cultivator

MEDICINE**Juice****I354****MEDICINAL PROPERTIES**

The **YELLOW JUICE** of this plant is used as a medicine for dropsy, jaundice and cutaneous affections In the West Indies it is reported to be used as a substitute for *ipecacuanha* It is also diuretic relieves blisters and heals excoriations and indolent ulcers The native practice of applying the juice of this plant to the eye in ophthalmia is dangerous, although interesting historically, the same practice having in all probability suggested the name *Argemone* (see generic description) The **SEEDS** have narcotic properties They yield on expression a fixed **OIL** which has long been in use amongst West Indian practitioners as an aperient It exercises a soothing influence when applied externally in headache, and also to herpetic eruptions and other forms of skin

Seeds**I355****Oil****I356****A. I356**

The Mexican Poppy

ARGEMONE
mexicana.

MEDICINE.

Infusion.
1357

disease Mr Baden Powell says that this is supposed to be the *fico del inferno* of the Spaniards who consider the seeds more narcotic than opium. An infusion of the plant is regarded as diuretic.

The following extracts from the writings of Indian authors will show the diversified opinions which are held with regard to this drug —

The juice of the plant in infusion is diuretic relieves strangury from blisters and heals excoriations. The seeds are very narcotic and said to be stronger than opium. Simmonds says The seeds possess an emetic quality. In stomach complaints the usual dose of the oil is thirty drops on a lump of sugar and its effect is perfectly magical relieving the pain instantaneously throwing the patient into a profound refreshing sleep and relieving the bowels. This valuable but neglected plant has been strongly recommended as an aperient anodyne and hypuotic by Dr Hamilton and other experienced practitioners in the West Indies. Samples of the oil were produced at the Madras Exhibition. It is cheap and procurable in the bazars being used chiefly for lamps (*Ansles Lindley Simmonds &c*) (*Baden Powell's Panjab Products I 326*)

The seeds and seed oil have been used by European physicians in India and there has been much difference of opinion regarding their properties some considering them inert and others asserting that the oil in doses of from 30 to 60 minims is a valuable aperient in dysentery and other affections of the intestinal canal. The evidence collected in India for the preparation of the *Indian Pharmacopæia* strongly supports the latter opinion my experience is also in favour of it and Ocharbonnier who examined the oil in 1868 found it aperient in doses of from 15 to 30 minims. Possibly those who have used the oil unsuccessfully purchased it in the bazar and were supplied with a mixed article no bazar made oils can be relied upon. An extract made from the whole plant has been found to have an aperient action and the milky juice to promote the healing of indolent ulcers. I have not noticed any bad effects from its application to the eyes. Recently (1878) a case has occurred in Bombay in which a number of people suffered from vomiting and purging after using sweet oil which had been adulterated with Argemone oil. The adulteration may be detected by the rich orange red colour developed when strong nitric acid is added to Argemone oil or to mixtures containing it (*The Vegetable Mat Med of Western India by W Dymock 40*).

The seeds are used in Jamaica as an emetic a thimbleful being bruised with water. Barton again describes them as being more powerfully narcotic than opium.

The Editor has subjected the seeds to numerous experiments and has never found them to show any emetic or narcotic influence they contain a bland oil resembling that of the poppy and which can be used in ounce doses without producing any purgative effect.

The juice which exudes on wounding or bruising this plant, is of a bright yellow colour and is used by the natives as an application to indolent ulcers and to remove specks on the cornea. It has by some writers been described as possessing the activity of gamboge. If this expressed juice of the plant be rendered alkaline by ammonia a precipitate falls which is partially soluble in hot alcohol giving a rich golden tincture on cooling and spontaneous evaporation silky crystals of an alkaline principle are deposited which we propose to term *argemonine*.

"We have given this argemonine in considerable quantities to dogs and did not find it induce any acrid or narcotic effects. It has not been as yet tried in hospital practice (*The Bengal Dispensatory and Pharmacopæia by W B O'Shaughnessy M.D. p 183*)

Special Opinions.—§ "I have used the seeds of *Argemone mexicana* in many cases and found them to be laxative, emetic nauseant, expect

1358

**ARGEMONE
mexicana****The Mexican Poppy****MEDICINE.**

orant and demulcent and the oil obtained from them is a drastic purgative nauseant and expectorant. The seeds and oil have also a beneficial control over asthma. The largest dose of the seeds I have used is two drachms and a half and even in so large a dose as this there was nothing in their action to lead to the suspicion of their being a narcotic as is generally supposed. It is difficult to account for such a supposition without suspecting that some other seeds were confounded with those under immediate consideration. I shall therefore describe the latter as minutely as I can and if due attention is paid to this description there will be no difficulty in distinguishing them from all other seeds. The seeds are small round hard striated dark brown and about the size of a small mustard seed. They are full of oil and if one of them is placed on paper with a hard substance underneath and pressed with the nail of the finger it breaks with a noise and leaves an oily stain on the paper. The kernel is white minute and albuminous. Although the doses of the seeds I have mentioned above are very large yet this is no disadvantage because they are always used in emulsion which is tasteless and can be sweetened if necessary. The emulsion is much liked by the patient.

There is also a great difference of opinion as to the action and dose of the oil of *Argemone mexicana*. Some say that thirty minims of it act as an efficient cathartic while others consider it to be quite inert and incapable of producing any purgative effect in ounce doses. I got this oil prepared three or four times in my own presence and tried it in many cases. The former opinion is quite correct and with regard to the latter it is necessary to say that so far from being inert in ounce doses it is unsafe to administer the oil in more than forty minims and produces a dangerous hypercatharsis when its dose is increased to one drachm. If the oil is fresh its average dose is twenty five minims and if old thirty five. It is a good drastic or hydrogogue cathartic in such doses and generally produces from five to ten or twelve motions. Its advantage over jalap rhubarb castor oil &c is the smallness of its dose and over the croton oil its freedom from unpleasant nauseous and acrid taste. Its disadvantages as a purgative are *firstly* that its action is not uniform even in its average dose, which produces more than 15 or 16 motions at one time and only 3 or 4 at another and *secondly* that it is generally accompanied by vomiting at the commencement of its operation. Though the latter is not severe it is undesired and an unpleasant effect in a purgative medicine. Hypercatharsis however, from the use of this oil is not generally attended with great debility nor with the other dangerous symptoms frequently observed under a similar condition from croton oil and some other purgatives. (*Honorary Surgeon Moodeen Sheriff Madras*)

Very common all over South India and the Deccan and the juice is in vogue as a native remedy. (*Deputy Surgeon General G Bidie, C I E Madras*). The yellow juice mixed with ghee is given internally in gonorrhoea. (*Surgeon Major D R Thompson M D Madras*). Oil aperient, sedative in colic dose 30 minims noticeable effect when applied externally to skin diseases. (*Apothecary Thomas Ward, Madanapalle Cuddapah*). 'The juice of this plant is much used by the inhabitants of Mysore for indolent and syphilitic ulcers and for itch'. (*Surgeon Major John North Bangalore*). The yellow juice is often used by natives in simple conjunctivitis. (*Honorary Surgeon Easton Alfred Morris Negapatam*). 'I found the juice very useful in scabies Asst Gowry Coomarr Mukerji found the powdered root in drachm doses useful in tapeworm'. (*Surgeon R L Dutt M D Pubna*). 'In Cuttack the seed of this plant is mixed with mustard seed as an adulteration'. (*Surgeon Major P N Mukerji, Cuttack, Orissa*). The yellow juice of the plant and

The Argyreia.

ARGYREIA.

the cold drawn oil of the seed is useful in scabies I have seen the insect killed (under the microscope) on the application of ether' (Surgeon K D Ghose, Khulna) Oil obtained from the seed is largely used by the Santals for the purpose of burning A valuable remedy for itch, (Brigade Surgeon S M Shurcore Moorshedabad) The juice of the plant is used as a detergent in chronic ulcers and sinuses with good effect (Assistant Surgeon Nundo Lal Ghose Bankipore) 'Useful in scabies (Surgeon Major C F W Meadows Burrisal) The fresh juice is used in scabies and indolent ulcers (Brigade Surgeon F H Thornton BA MB Monghyr) Known as Karwah in Oudh The oil is used in the West Indies on sugar for colic Has been tried in Oudh for the same ailment with advantage in several cases (Surgeon Major Bonavia Etawah) The seeds contain an alkaloid which gives reactions similar to morphia (Dragendorff) (Surgeon Major W Dymock Bombay)

The juice is efficacious in scabies I saw a case of dangerous inflammation of the eye caused by the application of the juice in ordinary conjunctivitis (Assistant Surgeon Shib Chunder Bhattacharj Chanda Central Provinces)

ARGENTUM

Argentum or Silver

Vern—The leaf *Chāndī kā varāq* H ND *Rupālī*, BENG *Taka SANTAL* *Rupydcha-varkh* MAR *Ruperivarakh chandī rupū* GUJ *Rupdī tagat* DUK *Velli rēkku* TAM *Vendī rēku* TEL *Vellit taksta* MAL *Belli rekhu* KAN *Vargul fisah* ARAB *Varge sim varge nuqrah* PERS *Ridi tahadu ridi tagadu* SINGH *Noye saku* BURM
The metal *Chandī rupā ruppa* HIND BENG *Bhote MAR* DUK GUJ *Rupo* SIND *Velli* TAM *Vendī* TEL *Velli* MAL *Belli* KAN *Fisah* ARAB *Sin nuqrah* PERS *Roupya rajata* SANS *Ridi* SINGH *Noye* BURM

Silver is too well known to require to be dealt with here in detail The following special opinions and notes regarding the Indian medicinal uses may however be found interesting

Medicine—§ Silver leaf is used medicinally combined with other metals chiefly with gold or iron for nervous diseases' (Surgeon G A Emerson Calcutta)

Argentum Nitras gr x admixture most useful collyrium in acute conjunctivitis Its action can be modified by a solution of common salt applied to the eye after the application of the argt nit (Surgeon Joseph Parker M D Poona)

Silver leaf is daily prescribed by the hakims along with the different preserves particularly that of Anvala fruit (*Phyllanthus Emblica*) in nervous palpitation dyspepsia and general debility (Surgeon Mokund Lall Agra)

Nervine tonic. The ash of silver (*raupya bhasma*) which is administered internally as a nervine tonic is prepared by mixing together 1 part of arsenic with lemon juice gr $\frac{1}{4}$ and $\frac{1}{2}$ part of silver leaves in a mortar and then enveloping the mixture in mud and clean cloth burn freely until reduced to ashes The ashes should be again covered over with mud and cloth and burnt (14 times altogether) (Surgeon W Warren Bhuj Cutch)

It is used as an amalgam in stopping teeth (Brigade Surgeon G A Watson Allahabad)

ARGYREIA, Lour Gen Pl, II, 869

A genus of scandent shrubs containing some 30 species belonging to the Natural Order CONVULVACEÆ The species are chiefly Indian (25 species); but one occurs in Africa and a few others in China and the Malaya

Leaves from cordate-ovate to narrow-lanceolate, silky hirsute or pubescent

A. 1361

MEDICINE.

I359

MEDICINE
I360

I361

**ARGYREIA
speciosa****The Elephant Creeper**

Cymes sessile or peduncled capitate or corymbose. *Flowers* showy purple or rose rarely white. *Sepals* from orbicular to lanceolate sub-equal or the inner smaller adpressed to the fruit often somewhat enlarged.

The generic name is derived from *αργυρεος*=silvery in allusion to the silvery tomentum of the under surface of the leaves.

1362

Argyreia speciosa, Sweet *Fl Br Ind*, IV, 195 *Wight, Ic*, t 851

THE ELEPHANT CREEPER

Syn — *LETTSOMIA NERVOSA* Roxb *Fl Ind Ed CBC* 164 *CONVOLVULUS SPECIOSUS* Linn

Vern — *Samandar ká-pát samandar sóf samandar sokh samandar-phairnd* HIND *Bichtarak guguli* BENG *Kedok arak*, SANTAL *Samudra palaka vridhdadaraka* SANS *Samudra soka* or *shokh* MAR *Samandar ká-pattá* DUK *Shamuddirap-pach chai* TAM *Samudra-pala chandra-poda kakkita pala samudra* TEL *Samudra-pach cha samudra yagam samudra pala* MAL *Mahadoomooda* SINGH

Moodeen Sheriff points out that the Hindustani and Deccan names of this plant are to be distinguished from *Samandar phal* the Hindustani and Deccan name of *Barringtonia acutangula*.

Habitat — A twining perennial plant found all over India ascending to 1000 feet in altitude from Assam to Belgaum and Mysore frequent in Bengal cultivated in China and the Mauritius. Extremely common in Western India. Dr Bidie informs me that it also extends to the extreme south of the peninsula of India.

Botanic Diagnosis — *Leaves* large ovate-cordate acute glabrous above persistently white tomentose beneath *peduncles* long *flowers* sub capitate *bracts* large ovate-lanceolate acute thin softly woolly deciduous *corolla tube* woolly *fruit* brown yellow stout nearly dry *stem* white tomentose almost woody (*Fl Br Ind*)

Properties and Uses—

Oil — Reported to yield oil but no definite information regarding this fact can be discovered.

Medicine — The LEAVES are maturative and absorptive and are used as emollient poultices for wounds and externally in skin diseases and by some authors they are even said to have rubefacient and vesicant properties. The ROOT is regarded as alterative tonic useful in rheumatic affections and diseases of the nervous system. In synovitis the powdered root is given with milk.

The large leaves which have the under surface covered by a thick layer of silky hairs afford a kind of natural impermeable piline and are used as a maturant by the natives. With regard to the alleged blistering properties of the upper surface of the leaf there must be some mistake as I find it has no effect when applied to the skin. (*The Vegetable Materia Medica of Western India* by Dr W Dymock 474)

Special Opinions — \$ Mixed with vinegar the sap is rubbed over the body to reduce obesity. (*Surgeon G A Emerson Calcutta*) Used externally in chronic eczema and as emollient poultices. Internally the root is given to rheumatic patients dose 5 to 20 grains. (*Surgeon W Barren Bhuj Cutch*) Leaves are used as a poultice in guinea worm. (*Surgeon Joseph Parker M D Poona*) Useful when applied to foul ulcers. (*Assistant Surgeon Shib Chunder Bhattachary Chanda Central Provinces*) The juice of this plant mixed with an equal quantity of gingelly oil and a little powdered dill seed, is used as an external application in scabies and other cutaneous diseases of children. (*Surgeon W A Lee, Mangalore*) In cases of unhealthy ulcers and sinus the white surfaces of the young leaves are applied, the hairs causing irritation and promoting the secretion of healthy pus. When the sores are pro-

OIL
1363
MEDICINE.
Leaves
1364
Root
1355
Powder
1366

1367

A 1367

The Arisæma.

ARISÆMA
Leschenaultii.

gressing favourably the smooth surfaces of the leaves are applied (*Brigade Surgeon J H Thornton B A, M B, Monghyr*) 'The leaves are both maturative and absorptive when the under part is applied to the inflammation it hastens suppuration, and the upper part resolution It is also efficacious in skin diseases (*T N Mukarji Revenue and Agri culture Department Calcutta*)

ARISÆMA, *Martius, Gen Pl, III, 965 Engler in DC Mono Phan, II, 533, N E Brown in Linn Soc Jour, XVIII, 246*

1368

A genus of herbaceous plants with tuberous (often edible) corms belonging to the Natural Order ARACEÆ There are about 50 species belonging to the genus, inhabitants of temperate and extra tropical Asia, with a few in America and Abyssinia In India there are some 22 species

Leaves 1 to 3, each 3-sected or pedate or verticillately lobed with 5 to many segments each broad acute or acuminate *margin* entire or crenulate *petiole* sheathing at the base *Spathe* deciduous tube oblong convolute at the base not infrequently many veined *mouth* contracted *blade* large acuminate or caudate *Peduncles* solitary *Spadix* with an appendix included within the spathe or exserted *Flowers* dioecious rarely monœcious male scattered female crowded with neuter subulate flowers above *Persianth* none *Male flowers* with 2 5 stamens sub-versile *Female flowers* with the ovary ovoid-oblong or globose 1 locular style short or O *ovules* 1 many orthotropous erect *panicles* short attached to a basilar placenta *Fruit* an obconic berry 1 or few seeded

Arisæma curvatum, *Kunth Engler in DC Mono Phan II, 544*

1369

Syn—ARUM CURVATUM *Roxb Fl Ind Ed C B C 628 Wight Ic t 788*

Vern—*Bir-banka NEP Gurin dor kirkichalu kirakal jangush PB*

Habitat—This plant grows at many places in the Panjáb Himálaya from 4 000 to 6 500 feet

Medicine—It is stated to have poisonous qualities In Kulú the seeds are said to be given with salt for colic in sheep

MEDICINE

Root.

1370

Seed

1371

1372

A. cuspidatum, *Engl Mon Phan, DC, II 536*

Syn—ARUM CUSPIDATUM *Roxb Fl Ind Ed C B C 628 Wight Ic t 784*

A. erubescens, *Schott*

1373

Syn—ARUM ERUBESCENS *Wall Pl As Rar II 30 t 135*

Habitat—The Himálaya and Western Ghâts

A. intermedium, *Blume*

1374

Habitat—The Western Himálaya (Simla 2 600 feet)

A. Jacquemontii, *Blume*

1375

Habitat—The Himálaya 2 000 to 4,000 feet

A. Leschenaultii, *Blume, Mono Phan, DC II 552*

1376

Syn—A. PAPILLOSUM *Stend*

Vern—*Wal kuddaran SINGH*

Habitat—A native of the Himálaya (Nepal), Khásia Hills the Nilgiri Hills and Ceylon

Medicine—The roots are employed as a medicine by the Singhal ese. (*Thwaites, En Plant Zeyl, 335*)

MEDICINE

1377

A. 1377

ARISTOLOCHIACEÆ

Aristolochiaceæ or Birthworts.

- 1378** *Arisæma Murrayi*, *Graham ; Cat Pl, Bombay*
THE SNAKE LILY OF THE KONKAN
- A. papillosum**, *Stend*, see *A. Leschenaultii*, *Blume*
- 1379** *A. speciosum*, *Mart Stewart, Pb Pl, 247*
Syn — *ARUM SPECIOSUM* Wall
Vern — *Samp ki khumb kiri ki kukri kralu* Pb
Habitat — Found in the Panjáb Himálaya from 6 000 to 8 500 feet
Medicine — In Hazara the root is stated to be poisonous in Chumba it is applied pounded to snake bites In Kulu where the root is given to sheep for colic the fruit is said to have deleterious effects on the mouth when eaten by children
- MEDICINE**
Root
1380
- 381** *A. tortuosum*, *Schott Engler, DC Mono Phan, II 545*
Vern — *Kiri ki kukri* Pb
Habitat — Found in Chumba at about 7 000 feet also eastward to Nepal
Medicine — The root of the plant is used to kill the worms which infest cattle in the rains
- EDICINE**
Root
1382
- ARISTIDA**, *Linn Gen Pl, III, 1140*
- 1383** *Aristida depressa*, *Retz Duthie's List of Grasses, 26 GRAMINEÆ*
Vern — *Spin khalak spin-wege jandar lamba lamp* Pb *Nalla-putiki* TEL
Habitat — Inhabits the plains in North India also found in the Southern Provinces Grows in a dry barren binding soil
Fodder — Roxburgh did not find that it was put to any use but *Stewart* says it is a favourite food for cattle in North India Cannot be cut with a scythe as it is too fine Particularly relished by cattle and is nutritious It is too short and light to stack (*Mr Coldstream, Commissioner, Hissar*)
- FODDER**
1384
- 1385** *A. setacea*, *Retz*
Vern — *Shipur gaddi* TEL *Thodappa-pullu* TAM
Habitat — Common in dry parts of the Panjáb and North West Provinces also in South India, where it grows in dry barren binding soil
Fodder — Cattle do not eat it yet it is very useful (*Roxburgh*) As to the remark that cattle do not eat this grass *Roxburgh* was apparently mistaken for *Bidie* says it is eaten by bullocks
Domestic Uses — The Telinga paper makers construct their frames of the culms it also serves to make brooms and tooth picks It is employed in preference to other grasses for making the screens called *tatties* for this purpose it is spread thin in bamboo frames and tied down these placed on the weather side of the house during the hot land winds and kept constantly watered during the heat of the day renders the temperature of the air in the house exceedingly pleasant compared to what it is without It is used in fact like the *khas-khas* roots in Northern India
- FODDER**
1386
- DOMESTIC**
Culms
1387
Tooth picks
1388
Tatties.
1389
- 1390**
- ARISTOLOCHIACEÆ.**
- A Natural Order of herbaceous plants with creeping rhizomes and creeping or twining stems wood, when present scented composed chiefly of parallel plates held loosely together by soft medullary processes, no
- A. 1390**

The Family of the Birthworts.

ARISTOLOCHIACEÆ.

concentric zones nor liber fibres. There are in all some 200 species in the world, referred to 6 genera. They are inhabitants chiefly of tropical America are rare in the north temperate zones occasional in tropical Asia and somewhat frequent in the Mediterranean region. In India there are in all some 6 or 7 indigenous species belonging to *Aristolochia* and *Bragantia*, with as many more introduced species chiefly seen under garden cultivation.

The genera are referred to three tribes the diagnosis of which if taken collectively constitute the characters of the order—an order which must be admitted as exceedingly artificial since it includes tribes dissimilar in vital characteristics. The affinities of the family are accordingly very obscure.

Tribe I—*Asarææ*

Herbs with perennial rhizomes having the lower leaves scab-like the upper reniform. *Flowers* terminal solitary. *Calyx* persistent limb regular 3 lobed. *Stamens* 12 all free the outer and shorter whorl opposite the styles, *anthers* introrse or extrorse. *Ovary* more or less inferior 6-celled short and broad. *a capsule* opening when ripe irregularly.

Asarum, *Heteropa*

For the former of the two genera in this tribe see *Asarum*.

Tribe II—*Bragantieæ*

Shrubs or under-shrubs. *Leaves* reniform oval or oblong lanceolate, reticulate. *Flowers* in spikes or racemes small (*Bragantia*) or large and campanulate (*Thottea*). *Calyx* deciduous closely appressed to the top of the ovary and 3 lobed. *Stamens* 6-36 equal and free. *Ovary* completely inferior elongated slender stipitate 4 gonous, 4 celled. *ovules* numerous 2 seriate on the middle of the septa. *Capsule* siliqueous 4 valved.

Bragantia and *Thottea*

For the former genus see its place in this Dictionary.

Tribe III—*Aristolochiææ*

Twining herbs (rarely scandent). *Calyx* deciduous constricted above the top of the ovary irregular tubular limb various. *Stamens* 6 (rarely 5). *anthers* sessile extrorse adnate by their whole dorsal surface to the column or style. *Ovary* completely inferior elongated slender stipitate 6-gonous 6 (rarely 5) celled. *ovules* numerous inserted at the central angle of the cells and 2-seriate. *Capsule* oblong or globose 6-angled 6 valved opening at the top or bottom.

Affinities of the Aristolochiaceæ are very obscure the gynandrous condition of the stamens and twining habit bring Aristolochiææ near to Asclepiadææ but the opposite leaves and superior ovary of the latter at once separates them. By some botanists an affinity to Cucurbitaceæ is seen in the twining stem alternate leaves inferior ovary and extrorse stamens but Cucurbitaceæ differ in their didymous double perianth, imbricated aestivation, in the number and condition of the stamens the mode of placentation and exalbuminous seeds. It seems almost impossible to assign a natural position for this family. The *Genera Plantarum* places them after Nepenthaceæ Cytnaceæ and before Piperaceæ, Monimiaceæ Laurineæ Santalaceæ, Balanophoreæ &c. and this would seem their most natural position. Like the Cytnaceæ they have a mono-perianth flower inferior often 1-celled ovary but Cytnaceæ are aphyllous and parasitic. With Nepenthææ they have many affinities and although it is only fanciful the pitcher like glandular development on the leaves of *Nepenthes* is exceedingly like the flower of the Aristolochias.

1391

ARISTOLOCHIA
bracteata**Birthwort.****1392**

Properties and Uses—Most of the Aristolochiæ contain in their roots a volatile oil a bitter resin and an extractable acid from which they derive their virtue as stimulants of the glandular organs and of the functions of the skin. The name Aristolochia is derived from *αριστος* best and *λογος* child birth or herbs which promote child birth in allusion to their reputation as emmenagogues. They are also administered as anti hysterics. As medicines they may be described as aromatic stimulating tonic and useful in the latter stages of low fever. They are bitter and acrid with a disagreeable odour. They are also described as purgative and are in India chiefly taken advantage of as mild aperients for children. They are all attributed with the property of being antidotes to snake-bite the two best known examples being the Virginian snake root and Guaco roots. The roots of the *Asarum* are emetic.

1393**ARISTOLOCHIA, Linn Gen Pl III 123**

As this is the only Indian genus belonging to the Tribe ARISTOLOCHIÆ it is scarcely necessary to add other characters to what have been already given. Aristolochia chiefly differs however from Holostylis in the pitcher like form of the flower and more numerous stamens.

1394**Aristolochia acuminata, Willd**

Botanic Diagnosis—An extensive twining plant. *Leaves* cordate entire acuminate from 4 to 6 inches long by 2 to 4 broad. *Flowers* large and pendulous.

1395**A. bracteata, Retz****THE BRACTEATED BIRTHWORT**

Vern—*Kirāmar gandun gandati* HIND DUK *Pattra bunga katrabunga*, SANS *Paniri URIYA Gandhati kidimāri* BOMB *Adu tina palai* TAM *Gadide gada para atu kadapara* TEL *Alutintap pala* MAL

Habitat—Found on the banks of the Jīmna and Ganges and in the Deccan. Seems to luxuriate on the black soils of Western India.

Botanic Diagnosis—*Leaves* reniform glaucous. *flowers* axillary solitary peduncled. *peduncles* furnished at the base with sessile reniform bracts.

MEDICINE
1396**Properties and Uses—**

Medicine.—Every part of this plant is nauseously bitter and is much used by the Hindu physicians on account of its anthelmintic and purgative properties. Two fresh leaves rubbed up in a little water and given to an adult for a dose once in 24 hours are considered a cure for purging with gripes (*Roxburgh*). The leaves are applied to the navel to move the bowels of children and are also given internally along with castor oil as a remedy for colic. The natives squeeze the juice of this plant into wounds to kill worms (*Dr Gibson*). It is spoken of by *Dalzell* as possessing a merited reputation as an antiperiodic in intermittent fevers. Other authors affirm that it holds a high reputation as an antiperiodic in the treatment of fevers. For this purpose it is often made into a paste along with the seeds of *Barringtonia aculungula*, *Celastrus paniculata*, and Black Pepper the whole body being rubbed with this paste in malarial fevers (*Dymock Dalsell Gibson's Flora of Bombay*). It is also supposed to be an emmenagogue. *Dr J Newton* reports that in Sind the dried root in doses of about a drachm and a half is administered during labour to increase uterine contractions.

A committee consisting of *Drs. Oarter, Dymock and Sakhārām Arjun*, reported on this drug as follows 'The drug consists of the

A. 1396

Birthworts.

ARISTOLOCHIA
indica.

whole plant in fruit it is nauseously and persistently bitter 'Anthelmintic antiperiodic and emmenagogue' Used in the bowel complaints of children, when depending on worms in intermittent fevers, and to increase uterine contractions during labour. The juice of the leaves is applied to foul and neglected ulcers to destroy maggots. Dose—1½ drachms of the dried root is given in powder or infusion in cases of labour. The juice of the fresh plant is chiefly used by native practitioners. According to the same authorities it is found on banks of rivers and water courses and in the black soils of Gujarát and Deccan. The price is Rs 8 per maund (*Home Department Correspondence 1880 p 323*). It was recommended by the Surgeon General of Madras to be excluded from the proposed new edition of the *Indian Pharmacopœia* (page 240).

§ This species or one resembling it is considered a powerful abortive, acting similarly in animals. The root is given mixed with round pepper' (*Surgeon W D Stewart Cuttack*). The leaves bruised and applied as a poultice remove maggots from ulcers (*Surgeon Major John Lancaster M B Chittore*). Antiperiodic anthelmintic also similar action to ergot on the uterus produces violent contractions of the womb during labour. Dose one to two drachms (*Surgeon W Barren Bhuj Cutch*). Antiperiodic (slight) tonic. Infusion of whole plant dried ½ oz boiling water 10 oz dose 1 to 2 oz (*Apothecary Thomas Ward Madanapalle Cuddapah*). Common in Madras regarded as anthelmintic and emmenagogue by natives (*Deputy Surgeon General G Bidie C I E Madras*).

Aristolochia hastata, Nuttall

Habitat—A species met with on the banks of the Mississippi.

Medicine—Used medicinally in America.

MEDICINE

1397

A. indica, Linn

THE INDIAN BIRTHWORT

Vern.—The root *Isharmul isharmul ki jar*, HIND *Isarmul* BENG *Bhedi janetet* SANTAL *Sapasan* BOMB MAR *Isha mul issharmul ki jar* DUK *Arkamula ruhimula* CUTCH GUJ *Sápús* GOA; SUN *anda hari jovari arkamulá* SANS *Zaravande hindi* ARAB, PERS *Ich-chura-muli* or *ich chura muli-ver peru marindu perum kishangu* TAM *Ishvara-véru, dula góvela govila*, TEL *Karalekam karukak pulla karal-vekam ishvarámúri* MAL *J hveri véru* KAN

Habitat.—A twining perennial found all over India—Bengal Konkan Travancore and Coromandel.

Botanic Diagnosis—*Leaves* cordate wedge shaped three-nerved with an undulated margin from 2 4 inches long by 1 2 broad *flowers* small erect

Properties and Uses—

Medicine—The root possesses emmenagogue and antiarthritic properties. It enjoys like all members of this genus the reputation of being a valuable antidote for snake-bite and is said to be used to effect abortion. It is also held in much esteem by the natives as a stimulant and tonic and is used by them in intermittent fevers and other affections. The early Portuguese settlers called it *Rais de Cobra* owing to its supposed efficacy against the bite of the cobra, being both taken internally and a powder of the root applied externally to the injured part.

A committee in Bombay consisting of Drs. Carter, Dymock, and Sakharám Arjun reported on this drug as follows: The drug, as found in the shops, consists of the root and stem the latter is by far

MEDICINE

1399

A. 1399

ARISTOLOCHIA
rotunda.**Birthworts.**

the largest portion In many parcels the stem only is to be found It is either in short pieces or the whole stem may be twisted into a kind of circular bundle The thickest portion of the stem is from $\frac{1}{4}$ to $\frac{1}{2}$ an inch in diameter and has a central woody column made up of about ten wedge shaped woody portions The bark is thick and corky marked with longitudinal ridges and numerous small warty projections it is of a yellowish brown colour The taste is bitter camphoraceous A stimulant, tonic and antiperiodic It is chiefly used in the bowel complaints of children and in intermittent fevers The juice of the leaves is believed to be efficacious in cases of snake-bites Emmenagogue properties have also been attributed to it Dose—of the decoction 1 to 2 ounces Price six annas per lb The drug can scarcely be called an article of commerce It is common in the jungles of West India (*Home Department Official Correspondence 1880 323*)

§ Tonic and stimulant excellent antidote for scorpion bite used externally and internally Dose—one to two drachms Produces abortion used as a cathartic in dropsy Dose of the expressed juice half to two drachms (*Surgeon W Barren Bhuj Cutch*)

It is undoubtedly used to produce abortion (*Brigade Surgeon S^r M Shircore Moorsheadabad*)

1400

Aristolochia longa, Linn

LONG ROOTED BIRTHWORT

Vern —The root *Zardvande tavil saravand* ARAB *Zarāvand-darās* PERS

Habitat —Indigenous to South Europe imported into India

MEDICINE
1401

Medicine —The leaves are said to be useful in the cure of snake bite especially cobra bites The root is bitter and used as an emmenagogue and in diseases of the womb and affections of the gums or ulcers also in indigestion and bowel complaints of children It is said to act as a tonic and febrifuge

§ Used by natives in apoplexy jaundice paralysis gout and chronic rheumatism (*Surgeon G A Emerson Calcutta*)

Much used by native hakims in these Provinces in cases of ulcer &c Suppositories prepared from this drug are supposed to produce abortion It is also applied locally in cases of scorpion sting (*Surgeon F Anderson M B Bijnor N W P*)

1402

A. reticulata, Nuttall

An American species used medicinally but only as a substitute for the true *Serpentaria*, it is a coarse species

1403

A. rotunda, Linn

ROUND ROOTED BIRTHWORT

Vern —*Zardvand-emudahray* ARAB *Zaravnde-gird* PERS

Habitat. —Indigenous in South Europe imported into Bombay

MEDICINE.
1404

Medicine —Used in coughs The root is hot and aromatic It is used by natives in the treatment of itch lice and intestinal worms also in leprosy and ulcers and to promote secretion of urine It is also known as an antidote for poisons Dr Dymock, in his *Materna Medica of West ern India* says it is difficult to get this drug pure, corms of an aroid being often substituted for it

§ "It is also used in rheumatism fever, emphesema, chronic bronchitis, caries of tooth, enlargement of spleen (*Assistant Surgeon F N Dey Feypore*)

A. 1404

| The Arnebia. | ARNEBIA. |
|--|--|
| <p>Aristolochia serpentaria, L</p> <p>THE VIRGINIAN SNAKE ROOT</p> <p>Habitat.—A native of North America</p> <p>Medicine.—The root of this species is given in the <i>Pharmacopœia of India</i> as the official form of <i>Aristolochia</i></p> <p>Medicinal Properties and Uses.—As its common and specific names of Snake root and Serpentaria imply Serpentary had formerly a high reputation for the cure of the bites of venomous serpents indeed it was first introduced into regular medical practice as a remedy in such cases but like all the so called specifics of vegetable origin which have been introduced for destroying the effects caused by venomous reptiles it is no longer regarded as of any remedial value As a stimulant tonic diaphoretic and diuretic it is however a medicine of some repute but in too large doses it causes nausea flatulency griping pains in the bowels and tendency to diarrhœa It has been extensively employed in typhus and typhoid fevers and has also been highly recommended in intermittent fevers but in the latter it is commonly given as an adjunct to bark or sulphate of quinia whose effects it is said to increase in a marked degree It has likewise been employed as an antidote against the bite of a mad dog but it has no more value in destroying the effects in such a case than as a remedy in the bites of venomous reptiles It is however used with good results in diphtheria chronic rheumatism atonic dyspepsia and in exanthematous diseases to promote eruption A strong infusion is also reputed to be serviceable as a gargle in malignant sore throat Garrod states that from observations made during many years he is inclined to think that serpentary is a remedy of some considerable power acting in a manner not unlike Guaiacum in stimulating the capillary circulation and promoting recovery in chronic forms of gouty inflammation and as it does not disturb the bowels it may often be administered when Guaiacum is not easily tolerated (<i>Bentl and Trim 246</i>)</p> <p>The official preparations are an infusion of the root in boiling water dose from one to two fluid ounces three or four times daily A tincture of the root in proof spirit dose from 1 to 2 fluid drachms This is regarded as a good adjunct to stimulant and diaphoretic mixtures Serpentaria is an ingredient in Tincture Cinchonæ Composition</p> <p>Chemical Composition.—The principal constituents of serpentary root are a volatile oil in the proportion of about 2 per cent and a bitter principle The volatile oil has the odour of the root and the bitter principle (aristolochin) which was first made known by Chevalier is described as an amorphous substance of a yellow colour a bitter and slightly acid taste and is soluble in both water and alcohol It requires further investigation The medicinal properties of serpentaria are doubtless essentially if not entirely due to these two substances But serpentary root also contains <i>tannic acid resin mucilage sugar</i> and some other unimportant ingredients (<i>Bent and Trim 246</i>)</p> <p>§ "It is met with in the bazars of Bombay and is in general use by native practitioners under the name of <i>Kala valâ</i>. It appears to be used as a substitute for <i>Pavonia odorata</i> in Sanskrit prescriptions" (<i>Surgeon Major W Dymock Bombay</i>)</p> | <p>I405</p> <p>MEDICINE I406</p> <p>Infusion I407 Tincture I408 I409</p> |
| <p>ARNEBIA, Forsk Gen Pl, II, 862</p> <p>Annual or perennial hispid, spreading herbs, belonging to the Natural Order BORAGINÆ Leaves alternate Racemes terminal elongated bracteate Flowers subsessile yellow Corolla-tube elongated lobes 5 distinct imbricate in bud Stamens 5, dimorphic in some flowers the stamens are below the</p> | <p>I410</p> <p>A. I410</p> |

**ARRACACIA
esculenta.****The Arracacha.**

mouth of the corolla and the style protruding, in others protruding and style short. *Nuts* on a flat or nearly flat receptacle scar basal large flat or but little hollowed out shortly produced up the inner surface without a prominent margin

There are in all some 12 species of which 4 occur in India but confined to the Panjáb Kashmir and Western Thibet

1411 *Arnebia tibetana*, *Kurz Fl Br Ind, IV, 176*

Vern — *Dimok* BHOTI (Aitchison)

Habitat — A native of North Kashmir and Western Thibet altitude 7,000 to 12,000 feet frequent

MEDICINE
Root

Medicine — § The scaly bark of the root stock is employed as a dye and medicine for cough by the Bhotis of Ladak' (*Surgeon Major J E T Aitchison Simla*)

1412

1413

Arnebia, sp

Dr Dymock informs me this root is imported into Bombay from Afghanistan and used as a substitute for *Alkanet* which see

ARNICA, *Linn Gen Pl, I 440*

1414

Arnica montana, *L DC Prod, VI, 317 COMPOSITÆ*

ARNICA

Habitat — Native of Western and Central Europe

MEDICINE

1415

Medicine — Imported into India being officinal in the *Pharmacopœia* Used internally as a stimulant and externally as a sedative and resolvent In British practice its use is limited to the application of the tincture to sprains &c

1416

Chemical Note — § Garrod's experiments on the use of Tincture of Arnica for bruises indicate that the tincture has no more power in expediting the recovery of the skin to its normal condition than spirit of the same strength The plant contains a bitter non crystalline glucoside *arnicin* (*Surgeon C J H Warden Prof of Chemistry Calcutta*)

Arnotto, the seeds of *Bixa Orellana*, *Linn* which see

1417

ARRACACIA, *Baner Gen Pl I 884 (ARRACACHA, DC Prod IV 243)*

A genus of perennial herbs containing some 12 species belonging to the Natural Order *UMBELLIFERÆ* They are natives of both Andean and South-West America one species being cultivated in most warm temperate regions forming an important article of food in Mexico

Underground part thickened tuberous edible *Leaves* pinnate or decompound *segments* dentate or pinnatifid *Umbels* compound *involucral bracts* foliaceous, 1 or 0 *bracteoles* many rarely foliaceous entire *Flowers* white, nearly allied to those of *Conium* *Sepals* dentate small *Petals* subentire point inflexed, broad or ovate *Silopods* conical undulate at the margin *Fruit* ovoid or ovoid-oblong, often pointed at the apex compressed at right angles to the septum and more or less constricted at the commissure *Pericarp* transversely subterete or 5-gonal *primary ridges* little or scarcely prominent sometimes unequal *Vitis* many often irregular or unequal confluent *Carpophore* 2 partite *Seeds* concave on the face sulcate or involute

The generic name is derived from the South American name *Arracacha*

1418

Arracacia esculenta, *DC, Prod IV, 244*

THE ARRACACHA, PERUVIAN CARROT APID Sp

Syn — A *XANTHORRHIZA* *Bancroft*

Habitat — Supposed to be a native of the elevated regions of equatorial America, Pasto, and New Granada It is now, however, met with in

A 1418

Arracacha or Peruvian Carrot.

ARRACACIA
esculenta.

cultivation over most warm temperate parts of America, where the weather is free from extremes of cold or dry summer heat. Introduced into Jamaica although many experiments have been made it has hitherto failed in Europe. One or two plants are alive at the present day in India, but its introduction as a food supply seems exceedingly doubtful.

Food—**M. De Oandolle** in his *L'Origin Cult Pl* gives some interesting information regarding this plant. He says that the tuber compares well with potato and the fecula is regarded as lighter and more pleasant to the taste. The lateral suckers which it throws out are used for propagation and they are also more esteemed as an article of food than the central stem.

In 1879 the Government of India Revenue and Agriculture Department obtained through the Secretary of State some plants of the *Arracacha* but on reaching Calcutta only two were found alive. After a few days these were sent to Sikkim. On the way one died and the other was retained at Mengpu (near Darjiling) but died in a few weeks.

Shortly after the Revenue and Agriculture Department obtained seeds which were sown in the Chajuri garden at Mussourie by **Mr. Duthie**, the Superintendent of the Saharanpore and Mussourie Botanical Gardens. Accounts of this trial have been given in the Annual Reports of these gardens and been reproduced in various publications. Up to date the introduction of *Arracacha* into India has failed. The following extracts from well known authors may however prove useful to persons desirous of prosecuting experiments in India with this most useful plant—

The root of this plant for the sake of which it is cultivated, is a fleshy body not unlike a parsnip in size and form but more blunt tender when boiled and nutritious with a flavour between the parsnip and a roasted chestnut. **Dr. Bancroft** compares it to a mixture of parsnip and potato. A fecula analogous to arrowroot is obtained from it by rasping in water as starch is from the potato. It yields a large produce according to **Boussingault** as much as sixteen tons per acre from land that will not bring more than nine or ten tons of potatoes. It requires deep rich soil and is renewed annually by off sets from the crown of the roots which the Spaniards call its sons (*Hijos*). Otherwise its cultivation is similar to that of the potato.

Several attempts have been made from time to time to introduce the arracacha into field culture in Europe but it will not yield even to garden management and all the experiments with it in Europe have terminated unsuccessfully. This seems to arise from the peculiar climate which it requires and to which we have nothing analogous unless in the south west of Ireland. The mean temperature of the arracacha country is said by **Mr. Goudot** who lived there for many years, to range from 64 to 82 there being neither frost nor cold weather nor dry summer heats but an even damp climate. We are therefore unable to fulfil the first conditions demanded for this plant in field culture, and this circumstance, together with a great difficulty in preserving the roots through a winter opposes an apparently insuperable bar to its introduction as a rival to our other eatable roots. (*Morton's Cyclopadia of Agriculture* 108)

In a communication to Sir Joseph Hooker, **Mr. Henry Birchall** of Bogota says. About 6000 feet is nearly the upper level of any extensive cultivation of this plant though it produces at points a good deal higher. It is rather difficult to obtain the seed as from habit the peons invariably pull up the flowering plants, as they do not produce the edible root. I have several times missed getting the seed by the stupidity of the men who weeded the plantations.

FOOD
Tubers.
1419
Fecula.
1420

1421

1422

ARROWROOT

The Saccaracha.

FOOD

'As regards cultivating from seed my own experience is *nil* but my neighbours assure me that by repeated replanting of the young plants at last the roots are developed

When this is attained the plant throws out a multitude of shoots from the crown These being broken off are prepared by slicing the base neatly and then putting them in a hole dibbled about 5 or 6 inches deep and require no further care than ordinary weeding for which the rows and plants should be 3 feet apart

In our climate the root comes to perfection in eight to ten months and the weight of a good specimen will be 8 to 10 lbs No doubt if scientifically cultivated and in properly loosened soil much larger roots would be obtained We do not even plough but stick the seed in immediately after burning off the forest or the brushwood as the case may be It is cheaper to take new ground than to cultivate properly the old as we have no command of skilled labour or good apparatus (*Kew Reports 1879 pp 31 32*)

1423

Mr Duthie reports from Saharanpur 30th May 1883 Of this valuable South American vegetable there are a few plants still left and they are in a fairly healthy condition They do not however appear to have formed to any extent the characteristic tubers which constitute the edible portion of the plants so highly valued in its native country M DeCandolle in his recently published work on the origin of cultivated plants observes that this vegetable bears comparison with potato and yields a starch which is lighter and more agreeable It has been tried in England and in several parts of Europe but without success the climate being evidently too damp for it I intend to give it a trial at Arnigadh where it will at any rate have a better chance of being looked after than it had at Chajuri

Mr Morris the Director of Public Gardens and Plantations Jamaica has communicated to *The Planter's Gazette* for October 16 1882 an important note on the little known cultivation of this esculent in Jamaica He states that it was introduced into the island in 1882 by Dr Bancroft it flourishes best in the Blue Mountain districts at elevations between 2 500 and 5 000 feet with mean annual temperatures of 72 and 65 Fahr respectively and a mean annual rainfall of 100 inches

'Mr Morris adds I believe the Arracacha is a most valuable food plant and for my own part I not only like it but find that it becomes more palatable and desirable the longer it is used If the natives of India take to it as an article of food I can conceive nothing more likely to flourish in the hill districts and to afford with little labour the means of sustaining life under adverse circumstances (*Kew Reports 1882 p 17*)

For further information see *Botanical Magazine t 3092 Comptes Rendus Nov 24 1845* and *The Gardener's Chronicle 1846 p 235* and *1848 p 491 Grisebach's Flora of British West India Islands*

1424

Arracacia moschata DC Prod, IV 244

THE SACCARACHA

Habitat.—The species is said to frequent colder regions than the preceding ascending in America to altitudes 8 400 feet It smells like musk hence the specific name, apparently this has not been introduced into Europe nor into India The tubers are edible

Arrowroot, see *Maranta arundinacea, Linn*, SCITAMINEÆ

A 1424

Arsenic

ARSENIC.

ARSENIC

Arsenic, White, or Arsenicum Album

Vern—*Sanbul khar safid sanbul sankhyd-sanbul sankhyd* HIND
DUK Sankha visha darumuch sambala kshara SANS *Sanka*
sumba laksh ra sammal khar BENG *Somal somal khar* GUJ *MAR*
Vellai pashanam TAM *Tella pashanam shenku pashanam* TEL
Vellap pashanam MAL *Phashana* KAN *Shuk turabul halik sam*
mulfar ARAB *Marge mosh or marg mosh* PERS *Sudu pasanam*
 SINGH

The word *sanbul* is used for white arsenic in the Deccan but is also used for *Nardostachys jatamansi* (Indian spikenard) in Arabic and Persian (*Moodeen Sheriff*)

§ The Arabic name is *sammul far* or the rat poison by which name it is sold in Muscat The Indian names *sambul khar* and *sambala kshara* are evidently corruptions of the Arabic name (*Surgeon Major C T Peters M B South Afghanistan*)

Dye and Tan—Arsenate of potash is used for preserving hides Crude white arsenic is used as veterinary medicine in Burma (*Prof Romanis Rangoon*)

Agricultural and Industrial Uses—Five pounds of arsenic and one pound of soda are to be boiled in five gallons of water until the arsenic is dissolved To one measure of this solution 160 measures of water are to be added and the liquid thus formed is recommended by an American entomologist to be sprinkled upon plants infested by worms The *Tropical Agriculturist Vol I p 602* adds [*Query*—Application of this solution for the destruction of grub It might kill them without in juring the roots (*Ed T A*)] Largely imported here for agricultural purposes (*Dr Dymock Bombay*)

Medicine—It is not necessary to discuss the imported and specially prepared European Arsenic compounds and drugs since these may be found in the *Pharmacopœia* the following notes should be understood to refer mainly to the indigenous drug In the *Indian Pharmacopœia* this substance is described as alterative tonic antiperiodic in large doses powerfully poisonous It has been used with much success in ague neuralgia and spasmodic affections and in chronic skin diseases, including leprosy In chronic rheumatism cancer uterine congestion menorrhagia snake-bite and chronic catarrhal affections it has proved an effectual remedy (*Pharm Ind*)

It can be obtained pure in most bazars is largely used at all dispensaries **Babu Rakaldas Ghose** read a valuable paper before the Calcutta Medical Society in which he stated that in obstinate cases of chronic intermittent fever which is seldom benefited by quinine he found arsenic to do much good (*Indian Medical Gazette May 1881*)

§ Useful in ague in doses of $\frac{1}{16}$ grain (*Assistant Surgeon Shib Chunder Bhattachary Chanda Central Provinces*) 'It is also considered as an aphrodisiac' (*Surgeon Anund Chunder Mukerji Noakhally*)

Much used in dispensary practice in malarious fevers and skin diseases (*Surgeon G Price Shahabad*) Antiperiodic, tonic relieves hemicrania when applied locally useful in rheumatism (*Surgeon W Barren Bhuj Cutch*) Invaluable in splenitis or ague in conjunction with quinine" (*Surgeon Major Henry David Cook, Calcutt, Malabar*)

Very good in bad cases of anæmia." (*Surgeon H D Masani Karachi*)

Chinese Arsenic.—*Sin shih* Arsenious acid, also called *Pih-sin* and *Hung pe* Of the specimens which I have received some are apparently

1425

DYE & TAN
1426

1427

MEDICINE
1428

1429

A. 1429

ARTABOTRYS
suaveolens**The Artabotrys**

a natural mineral constituting a translucent crystalline mass varying in colour from pure white to a yellowish brown or grey Other specimens have the aspect of the ordinary massive white arsenic of European commerce

Tsse hwang yellow sulphuret of arsenic native orpiment *Pun tsaou* It occurs in the province of Yunan probably also in Burma as it has been shipped in considerable quantities from Moulmein *Ainslie* states that it is exported from China to India

Orpiment is resorted to by the Chinese in cases of ague but compounded in a manner so absurd as to render the dose extremely uncertain or even a nonentity

Heung hwang Native Red Sulphuret of Arsenic Realgar *Hium hoam* Cleyer *Med Simp* No 176 It is found in the province of Yunan in the south of China and has been exported in small quantities to London from Canton Realgar is also sometimes imported into England from Bombay

Small shallow cups elegantly carved out of this mineral and often highly polished are used by the Chinese for administering certain medicines by which means when the inner surface of the cup is as sometimes happens in a somewhat disintegrated condition it is evident that a minute dose of arsenic may be administered (*Hanbury's Science Papers pp 220 221*)

I430

ARTABOTRYS, R Brown Gen Pl I 24

A genus of sarmentose or scandent shrubs belonging to the Natural Order ANONACEÆ comprising some 15 species 10 of which are met with in India

Leaves shining *Flowers* solitary or fascicled usually forming woody hooked recurved bristles (peduncles) *Sepals* 3 valvate *Petals* 6 2 seriate base concave connivent *limb* spreading flat subterete or clavate *Stamens* oblong or cuneate *connective* truncate or produced *anther cells* dorsal *Torus* flat or convex *Ovaries* few or many *style* oblong or columnar *ovules* 2 erect collateral *Ripe carpels* bearded

I431

Artabotrys odoratissimus, R Br Fl Br Ind I 54

Syn — UNONA ODORATISSIMA and HAMATA Roxb *Fl Ind ii 666*

Vern — *Madmanti madan mast* DUK ; *Vilayati chumpa* BOMB *Manoranjitam* TAM *Phala sampenga sakala-phala sampenga manoranjitam* TEL *Madura kameshvari manuranjitam* MAL *Manoranjitam* KAN (MADRAS)

Moodeen Sheriff says (that the Vythians assign a narcotic property to the flowers of this plant *Madan mast ke-phul*) hence the meaning of the Dukhni names—*intoxicated* He adds however that the name is applied to the rhizomes of a Curcuma and also to a species of Aconitum Dr **Dymock** informs us that *Madan mast* is the name by which the tubers of a species of *Amorphallus* are sold in Bombay

Habitat — Southern parts of the Western Peninsula and in Ceylon cultivated throughout India

I can find no record of the uses of this plant The odour of the strongly scented flowers is closely allied to that of the Ilang Ilang (*Cananga odorata*)

MEDICINE
I432
PERFUMERY
I433

I434

A suaveolens, Blume Fl Br Ind, I 55

Vern — *Durie carban* INDIAN ARCHIPELAGO

Habitat — A large woody climber met with in the forests of the Eastern Peninsula, from Sylhet to Malacca.

A I434

Wormwood

ARTEMISIA
Absinthium

Medicine—Blume informs us that the leaves of this plant are used to prepare an aromatic infusion whose good effects have been extolled in the treatment of cholera. The seeds also afford a scented oil. These same properties are by some authors attributed to *Cananga odorata*, and it would appear that this plant, along with the two species of *Artabotrys* mentioned, are used for the same purposes. I have not been able to learn, however, that the remedial virtues for which they are famed in the Malaya are known to the people of India. It does not appear that the natives of India extract even the oil, although they frequently wear the flowers on their *pugris* or to deck their hair.

Artanthe elongata, Miq. see *Piper angustifolium*, Ruiz. PIPERACEÆ

ARTEMISIA, Linn. Gen. Pl., II 435

A genus of herbs or shrubs belonging to the Natural Order COMPOSITÆ. It contains about 150 species chiefly inhabitants of the north temperate regions.

Strongly scented. *Leaves* alternate entire serrate or 1-3 pinnatisect. *Heads* small solitary or fascicled racemose or panicled never corymbose heterogamous or homogamous disciform. *ray flowers* female 1-seriate fertile very slender 2-3 toothed. *disk flowers* hermaphrodite fertile or sterile. *limb* 5 fid. *Inflorescence* ovoid subglobose or hemispheric. *bracts* few seriate outer short margins scarious. *receptacle* flat or raised naked or hirsute. *Anther bases* obtuse entire. *Style arms* of hermaphrodite flowers with truncate usually pericillate tips often connate in the sterile flowers. *Achines* very minute ellipsoid oblong or subobovoid faintly striate. *pappus* 0. (*Fl. Br. Ind.* III 321)

The generic name is the classical name for wormwood. Lat. *Artemisia* Gr. *ἀρtemisia*

Artemisia Absinthium, Linn. *Fl. Br. Ind.* III, 328

THE ABSINTHE WORMWOOD

Syn—*ASSINTHIUM VULGARIS* Gærtn. A. OFFICINALE Lam.

Vern—*āfsanthin* PERS. and ARAB. *Vil-yati āfsantīn* HIND. DUK.

Habitat—An aromatic silky hoary herb met with in Kashmir altitude 5000 to 7000 feet distributed to North Asia Afghanistan and westward to the Atlantic.

Botanic Diagnosis—This belongs to the section *Absinthium* or the species of *Artemisia* with heterogamous heads ray flowers (female and disk flowers hermaphrodite) and with the receptacle covered with long hairs.

A perennial species with hoary pubescence. *stem* erect angular and ribbed. *Leaves* ovate or obovate unequally 2-3 pinnatifidly cut into spreading linear lanceolate obtuse segments hoary on both surfaces radical and lower cauline leaves narrowed into winged petioles. *Heads* $\frac{1}{2}$ – $\frac{3}{4}$ inch diameter deduced hemispheric in drooping second racemes terminating the branches. *outer involucre bracts* oblong hoary narrowly scarious inner orbicular broadly scarious. *receptacular hairs* long straight.

History—Several species of *Absinthium* (ἄψινθιον *apsynthion*) are referred to by *Dioscorides*, one of which appears to be this plant. The passage "He hath made me drunk with wormwood" (*Lamentations of Jeremiah Chap. III 15*) doubtless refers to this plant and it seems very probable that the extract which is so largely consumed in France at the present day was the preparation which produced the intoxication.

Oil—Wormwood yields by distillation a dark green or yellow oil having a strong odour of the plant and an acrid taste. It is isomeric with camphor and has the specific gravity 0.972. According to Dr. Wright it is chiefly composed of *absinthol* ($C_{10}H_{16}O$) and when heated with phosphorus, pentasulphide, or zinc chloride, it splits into cymene ($C_{10}H_{14}$) and a resinous substance. The colouring substance is the *Azulene* of *Picasso*.

MEDICINE
Leaves

I435

Infusion

I436

Seeds

I437

OIL

I438

PERFUMERY
Flowers

I439

I440

I441

I442

OIL
I443

ARTEMISIA
maritima**Worm-seed****MEDICINE**
1444

In large doses this oil is a violent narcotic poison in a man $\frac{1}{2}$ oz caused insensibility convulsions foaming at the mouth and a tendency to vomit

Medicine—According to Braconnot 100 parts of this plant yield 1.5 of the volatile oil 30 of bitter extractive matter 2.5 of a very bitter resin and 5 of a green resin. The plant yields also a large quantity of ash chiefly carbonate of potash known from remote times as salt of worm wood. The whole herb is an aromatic tonic and formerly enjoyed a high reputation in debility of the digestive organs. It was also regarded as an anthelmintic but as Ohristison remarked through the caprice of fashion it is neglected at the present day. It is now chiefly used as a domestic and family medicine in Europe but before the discovery of cinchona it was largely used in intermittents. It exercises a powerful influence over the nervous system and its tendency to produce headache and other nervous disorders is well known by travellers in Kashmír and Ladák who suffer severely when marching through the extensive tracts of country covered with this plant.

Infusion**1445****Decoction****1446****Poultice****1447****ABSINTHE****1448**

It is chiefly used in the form of an infusion either in water or spirit dose one to two ounces. A decoction is less narcotic than the infusion. The herb is sometimes prescribed in the form of a poultice or fomentation as an antiseptic and discutient.

Absinthe—A liqueur largely consumed in France consists essentially of an alcoholic solution of oil of wormwood containing a little angelica anise and marjoram. If carefully prepared it is of a bright green colour.

The effects of this liqueur are peculiar and possess features not manifested by alcoholic excess. This has been described as absinthism. By the French Act of 1872 the trade in this liqueur has been put under severe restrictions. Its use has been prohibited in the French Army and Navy. Its effects appear to be exhilarating but the habitual use or excessive use brings on gradual diminution of the intellectual faculties ending in delirium and death. These effects resemble those produced by the oil. Absurd and extravagant statements appear, however to have been made regarding the injurious effects of absinthe but it is an established fact that its abuse is even more dangerous than the excessive consumption of alcoholic drinks. (*Bent & Trim U S Dispens Smith's Dict Fluck & Hanb Pharm Royle's Mat Med Ed Harley &c*)

1449

Artemisia Abrotanum, a garden plant sometimes seen in India is the Southern wood or Old Man of English writers. It is a native of the south of Europe and is a favourite on account of its stimulating aromatic odour.

1450

A. Dracunculus, Linn *Fl Br Ind III 321*

Habitat—Western Tibet altitude 14 000 to 16 000 feet Lahoul Afghanistan West Asia and South and Middle Russia.

FOOD**1451**

Food—Introduced into Europe as a cultivated pot herb nearly 300 years ago. It is the Tarragon of English gardeners used to flavour dishes. Although a native of India, it does not appear to be put to any economic use.

A. indica, Willd Syn for **A. vulgaris**, Linn which see

1452

A. maritima, Linn *Fl Br Ind, III, 323*

WORM SEED LEVANT WORM SEED OF SANTONICA, *Eng*; **SEMEN CONTRA**, **SEMECINE**, **BARBOTINE**, *Fr* **WURM SAMEN**, **Zi** **TWERSAMEN**, *Ger*

Syn → *Artemisia* sp in *Pharm Ind*

A 1452

Santonica.

ARTEMISIA
maritima.

Vern — *Shih sariqun* *afsantin ul-bahr* (αψιθιον) ARAB PERS
Kiramant owa BOMB

Habitat — Western Himálaya from Kashmir to Kumaon altitude 7 000 to 19 000 feet Western Thibet abundant in salt plains altitude 9 000 to 14 000 feet Commercially obtained from Russia

Botanic Diagnosis — This species belongs to the section *Seriphidium* : e, with homogamous heads flowers all fertile receptacle naked it is the only Indian representative of this section

An exceedingly variable plant with erect or sometimes drooping flower heads The whole plant hoary or tomentose shrubby below stems erect or ascending much branched from the base Leaves ovate 2 pinnatisect segments small spreading linear obtuse upper imple linear Heads 3-8 flowered ovoid or oblong sub erect in spicate fascicles involucre bracts linear oblong outer herbaceous tomentose inner scarious acute glabrous

TRADE SUPPLIES — In European commerce there are two forms of Worm seed — 1st Aleppo Alexandria or Levant Worm seed and 2nd Barbary Worm seed The former comes from Persia Asia Minor or other parts of the East and the Barbary from Palestine and Arabia

Fluckiger and Hanbury in their invaluable *Pharmacographia* say The drug which consists of the minute unopened flower heads is collected in large quantities as we are informed by Bjorklund (1867) on the vast plains or steppes of the Kirghis in the northern part of Turkestan It was formerly gathered about Sarepta a German colony in the Government of Saratov but from direct information we have (1872) received it appears to be obtained there no longer

The emporium of worm seed is the fair of Nishnei Novgorod (July 15th to August 27th) whence the drug is conveyed to Moscow St Petersburg and Western Europe In 1864 11 400 cwts were imported into St Petersburg Dr Dymock says it is brought from Afghanistan and Persia to Bombay in considerable quantities value Rs 2½ to Rs 3 per maund of 37½ lbs

Medicine — The flower heads of this plant are largely used for their anthelmintic deobstruent and stomachic tonic properties In the form of a poultice it is used to relieve the pain caused through the stings of insects and poisonous bites Santonine is chiefly employed in the treatment of round and thread worms It has the peculiar property of sometimes causing objects to appear yellow to patients under its action

Worm seed of the Bombay market has been examined by Hanbury who considers that it does not materially differ from the Russian drug but is slightly shaggy and mixed with tomentose stalks Arabic and Persian writers on materia medica generally describe Worm seed under the name *Shih* giving as synonyms *Sariqun* and *Afsantin ul bahr* In Bombay *shih* is the recognised Arabic name of the drug amongst the hakims who prescribe it in doses of from 2 to 3 drachms as an anthelmintic and as a deobstruent and stomachic tonic In the form of a poultice they use it to relieve the pain caused by the bites of scorpions and venomous reptiles

§ I have constantly observed santonine to be inert if administered when the worm is young [This was in Rangoon] (*Honorary Surgeon P Kinsley Chisacole Madras Presidency*)

Useful in gleet (*Surgeon H D Masani, Karachi*) It renders the urine of a deep yellow colour (*Brigade Surgeon G A Watson Allahabad*) 'I have never seen the optical effect from santonine though I frequently use the drug in fact, I have made special enquiry on this point.' (G. B)

1453

MEDICINE
1454

A. 1454

**ARTEMISIA
scoparia****Worm-seed.****1455**

Chemical Composition—§ The small seed like flower heads contain an essential oil which has an odour resembling cajuput oil and camphor. The anthelmintic properties of the acids are due to a glucoside **santonin**. According to **Hesse** santonin is an hydriac of a crystallizable acid **santoninic acid** which when heated to 12 C is resolved into santonin and water. When heated with an alkali santonin is not resolvable into santonin and water (*Pharmacographia*) (*Surgeon C F H Warden Calcutta*)

**Santonin
1456**

Santoninum or **Santonin** is a crystalline substance prepared from worm seed about 1.2 to 1.4 per cent being obtained. It occurs in flattened shining prismatic crystals not altered by air but readily affected by light turning yellow. It is odourless and tasteless becoming in the mouth ultimately bitter. It is nearly insoluble in cold water soluble in 250 parts of boiling water or 40 parts of alcohol at 15 C or in 3 parts of boiling alcohol. When heated it melts at 170 C forming if rapidly cooled an amorphous mass. The formula given for santonin is $C_{16}H_{18}O_8$ the principle of its isolation consists in that while not an acid it is capable of combining with bases i.e. santonin boiled with milk of lime. This forms santoninate of calcium a soluble substance. On the addition of hydrochloric acid santoninic acid $C_{16}H_{20}O_4$ is precipitated and parting with H_2O santonine is thus produced.

**Santoninic
Acid
1457**

Fatal consequences have repeatedly followed the administration of large doses of this drug the symptoms being giddiness mental apathy great paleness and coldness of the surface of the body vomiting profuse sweating trembling mydriasis and finally loss of consciousness and convulsions. All objects appear yellow or even green and the urine has been observed coloured after 16 minutes. The dose for an adult is from 2.4 grains for a child two years old $\frac{1}{4}$ to $\frac{1}{2}$ grain (*U S Dispens Gluck and Hanb Pharm &c*)

1458**Artemisia parviflora, Roxb Fl Br Ind, III 323****Vern**—Kanyurts PB *Burmar basna tashang* LADAK

* **Habitat**—Common in the higher regions of North West Himálaya in Lahoul and Ladák

Fodder—Browsed by goats and sheep**FODDER
1459
1460****A. persica, Boiss, Fl Br Ind III 327****Vern**—Shih sarigun afsantín ul bahr ARAB and PERS *Pardesi dawano* GUJ *Dawana* MAR

Habitat—Collected by **Bellew** in Afghánistan it is also found in Western Tibet altitude 9000 to 14000 feet

Botanic Diagnosis.—Receptacle puberulous

Medicine—**Bellew** states that the plant is used as a tonic febrifuge and vermifuge

**MEDICINE
1461****1462****A. sacrorum, Ledeb Fl Br Ind III, 326****Vern**—Tatwen munyá niurtsi jau chumbar sbur burnak PB *Tatwen burmack* LADAK

Habitat—Western Tibet Kanáwár and the Thibetan region of Kumaon altitude 9000 to 17000 feet

Medicine—Said to be given medicinally to horses in affections of the head

**MEDICINE
1463****1464****A. scoparia, Waldst & Kit Fl Br Ind, III, 323****Vern**.—Yhaw lasaj pila jau buir hing khak durunga lawange doné maria PB *Chwri sarof danti*, BAZAR NAME**Habitat**.—Found in the Upper Gangetic plain and westward to Sind**A 1464**

Indian Wormwood

ARTEMISIA
vulgaris.

and the Panjáb Western Himálaya from Kashmír to Lahoul altitude 5 000 to 7 000 feet Western Thibet, altitude 7 000 to 12 000 feet

Medicine—The branches appear to be officinal in the Panjáb The smoke is considered good for burns, and the infusion is given as a purgative

Fodder—Browsed on by cattle and sheep

Artemisia Sieversiana, Willd Fl Br Ind, III, 323

Vern—*Afsantín dauna* PERS ARAB and BOMB

Habitat—Western Himálaya from Kashmír to Lahoul altitude 8 000 to 10 000 feet Western Thibet China and Russia

Medicine—A plant very similar to *A Absinthium, Linn* It is said to be cultivated at Bandora near Bombay by Christians from whom the fresh herb reaches the market The Bombay imports of the drug are from Persia Hakims prescribe this medicine in hypochondriasis jaundice dropsy gout scurvy being used as a tonic deobstruent febrifuge and anthelmintic also as an emmenagogue It is applied externally as a discutient and antiseptic (*Dymock Mat Med W Ind 361*)

A. sternutatoria, Roxb see Centipeda orbicularis, Lour COMPOSITÆ**A vulgaris, Linn Fl Br Ind III, 325**

INDIAN WORMWOOD, FLEA BANE

Syn—*A INDICA Willd*

Vern—*Nagdouna majtari mastaru dona* HIND *Nugdón* BENG *Tataur, puujan banjiru chamra ubusha tarkhd* PB *Bui mádarán afsuntín* PB BAZAR NAMES *Surband* MAR *Titapat* NEPAL *Nága damani granthiparni* SANS

Dr Moodeen Sheriff supplies the following note regarding the vernacular names for the forms of this species In Madras the native names are referred to two sections (a) *A VULGARIS*—*Marsanyósh* ARAB *Marsangósh* PERS *Douna* HIND DUK *Mar s kurundu* TAM *Davanamu* SANS TEL KAN (b) *A INDICA*—*M s patri* DUK *Machi pattari* TAM TEL MALA and KAN *Garanthiparni*, SANS *Afsant ne hindi* ARAB and PERS *Walkotundu* SINGH, *Marva* is not a Hindustani synonym for *Dound* as is supposed in some books it is the name for *Origanum Majorana*

Habitat—Throughout the mountain tracts of India altitude 5 000 to 12 000 feet on the West Himálaya Khasia Hills Mánipur and the mountains of North Burma A gregarious shrub coming up on old cultivations between 3 000 and 6 000 feet in the Sikkim Hills and often covering large tracts of land until killed down by the tree growth which succeeds it (*Gamble*) Mount Abu the Western Ghâts from the Konkan southwards to Ceylon Distributed to temperate Europe and Asia Siam Java &c

Botanic Diagnosis—A tall shrubby plant with hoary pubescence or tomentose *Stems* leafy paniculately branched *Leaves* large ovate lobed lacinate or 1 2 pinnatipartite white tomentose beneath rarely hoary or green on both surfaces *lobes* acute irregularly serrate or lobulate lower petioled, upper sessile or with stipule like petioles uppermost linear lanceolate, entire *Heads* $\frac{1}{2}$ to $\frac{1}{4}$ inch long ovoid or subglobose clustered or seriate subsecund in short or long suberect or horizontal panicled racemes *involucre-bracts* woolly or glabrate outer small herbaceous inner almost wholly scarious *Corolla* glabrous **Sir J D Hooker** adds to the above description that he is unable to separate, even as varieties the following plants referred to by Indian authors *A indica, A dabia, A*

MEDICINE
Infusion
1465
FODDER
1466
1467

MEDICINE
1468

1469

A. 1469

ARTHROCNEUMUM
indicum
Arthrocneumum.
MEDICINE
 Infusion
I470

myriantha, *A. paniculata*, *A. leptostachya*, *A. grata*, *A. Roxburghiana* (of Calcutta Botanic Gardens)

One or two of the forms of this species along with *A. Absinthium* constitute the officinal worm wood

Medicine—It has stomachic and tonic properties and is used as a febrifuge. Dr Wight states that the leaves and tops are used in nervous and spasmodic affections connected with debility also an infusion of them is given as a fomentation in ulcers (*Illust II 92*). It may be used as an inferior substitute for cinchona in intermittent fevers. It is also employed in dyspepsia and as an anthelmintic and in liver diseases.

Amongst the vernacular names of this plant has been included the Mohammedan word *afsantin* and it seems probable that this is one of the sources of the remedy known by that generic name.

Moxa
I471

The term *Moxa* is applied to a cube of inflammable tinder ignited in contact with the skin in order to produce cauterization. For this purpose in many parts of the world the tomentum from the leaves of wormwood is often used. The origin of the word *moxa* is obscure but the practice of burning to produce revulsion thereby relieving deep seated inflammation has been practised both by savage and civilised nations. The Mánipuris and also the Angámi Nagás rub between the palms of the hands the withered leaves of this plant as also a species of *Anaphalis*, until the tissue crumbles away leaving only the tomentum in the hand. This they preserve as a tinder which they ignite by rubbing rapidly a round stick by means of a string made to revolve upon a small ball of the tinder placed in a hole in the ground (or simply between the hands) until the friction of the point ignites the tinder. I could not discover that they used this tinder as a *moxa* although I made careful enquiries.

Tinder
I472

§ It is used as a tonic anthelmintic antispasmodic and expectorant especially in diseases of children. The native women believe that its presence protects children from being eaten by witches (*Brigade Surgeon F H Thornton Monghyr*). Expressed juice is applied by native practitioners to the head of young children for the prevention of convulsions (*Brigade Surgeon S M Shircore Moorshedabad*). In Hindu medicine it is given in skin diseases and foul ulcers as an alterative (*Civil Medical Officer U C Dutt Serampore*). Tonic and antiperiodic (*Surgeon W Barren Bhuj Cutch*).

MANURE
I473
DOMESTIC
I474

Manure—Its ashes when burnt are considered to give a good manure for cultivation.

Domestic Uses—Wormwood is used to prevent moths and other insects from infesting clothes and furniture. It is used as a symbol of bitter calamity and is frequently mentioned in the Bible.

ARTHROCNEUMUM, Moq, Gen Pl III 65
I475

Arthrocneumum indicum, Moq DC Prod, XIII, 2 151 CHENO
PODIACEÆ

Syn—*SALICORNIA INDICA Willd Icon 737 non R Br (Pharm Ind)*
Vern—*Ṭadu-palang* BENG *Machola ghuri* BOMB; *Chil*, GUJ
Machul MAR Umari TAM Koyyapippili TEL

Habitat—A gregarious weed met with in the Sunderbunds and along the Coromandel Coast also at Bombay.

MEDICINE
Barilla
I476

Medicine—Roxburgh urges that the preparation of 'fossil alkali' or barilla from this plant should be encouraged on the Coromandel Coast but he does not inform us whether it was actually prepared. Compare with remarks under *Crozylon*, *Salicornia*, and *Barilla*.

A. I476

The Chaplasha Tree.

ARTOCARPUS
hirsuta.

ARTOCARPEÆ, Gen Pl, III, 346

An important tribe of URTICACEÆ referred by many botanists to the Sub-order MORÆÆ which see. It may be said to be represented by the Banian or Fig and the Jack fruit

1477

ARTOCARPUS, Forst Gen Pl III 376

A genus of evergreen trees with milky sap belonging to the Tribe ARTOCARPEÆ of the Natural Order URTICACEÆ. It comprises some 40 species inhabitants of tropical Asia Ceylon the Malaya China and of the Pacific Islands

1478

Leaves alternate large coriaceous penninerved entire or lobed *stipules* lateral often very large *Flowers* small very numerous monocious male and females forming distinct axillary and solitary pedunculate globose or cylindrical heads *Male flowers* with a perianth of 2 3 4 lobed or partite *segments* obtuse concave imbricate *Stamen* 1 erect, *anther* slightly exerted *ovary* rudimentary *Female flowers* perianth tubular ovoid-oblong or linear *bases* fleshy and consolidated into the infrutescence apices free with a minute opening often 3 4 dentate *Ovary* erect included within the amalgamated perianths, free from each other 1 locular rarely 2 3 locular with a solitary pendulous ovule *style* terminal or lateral simple or 2 3 fid *stigma* various *Nuts* enclosed within the persistent and consolidated perianth tubes forming the so-called flakes of the syncarpium *Seeds* pendulous *testa* membranous *albumen* none *embryo* erect or incurved *cotyledons* equal thick fleshy or unequal *radicle* short superior

The generic name is derived from *apros* bread and *karpos* fruit in allusion to the species popularly known as the Bread fruit tree

Artocarpus Chaplasha, Roxb, Fl Ind Ed C B C 634 URTICACEÆ

1479

Vern—Chaplash chaplis BENG Lutter NEPAL Chram GARO Sam ASS Cham CACHAR Pani toponi MAGH Toungeingnai toungeingne BURM Kaita da AND

Habitat—A lofty deciduous tree met with in Eastern Bengal Burma and the Andaman Islands

Botanic Diagnosis—A tall erect straight growing tree *Leaves* in young tree pinnatifid when old obovate entire or remotely dentate *stipules* long axillary caducous *Male* and *female heads* on long peduncles *Fruit* spherical

Nearly allied to *A. Lakoocha*, with which compare

Caoutchouc—Kurz remarks that in Burma it yields a tenacious milky caoutchouc

CAOUTCHOUC
1480
TIMBER.
1481

Structure of the Wood—Yellow to brown moderately hard even grained rough durable seasons well. It seems to get harder and heavier as it gets older. Two specimens from the Andaman Islands cut in 1866 and stored since then in Calcutta give respectively 46 and 52 lbs and Skinner gives 63 lbs but this is probably a mistake (*Gamble*)

It is much used for canoes in Sikkim and Assam for planking tea boxes and furniture Roxburgh says that this wood is regarded as superior to every other sort, particularly when employed under water

A. hirsuta, Lamk ; Brandis For Fl, 426

1482

Vern—Pât-phanas rán-phanas MAR Aym anjall or angeli ayanapela TAM ; Aini ansjens anjeli, MAL ; Hebalsu, heb halasu hesswa hessain KAN

Habitat—A lofty evergreen tree of the forests of the Western Ghâts ascending to 4,000 feet.

A 1482

ARTOCARPUS
integrifolia**The Jack-fruit Tree****CEMENT**
1483**FOOD**
Fruit
1484
TIMBER
1485

Botanic Diagnosis—Young shoots hirsute leaves alternate petiole ovate obtuse entire somewhat hairy underneath particularly on the veins 6-7 by 4.5 inches stipules hirsute on the outside lanceolate Male heads cylindrical pendulous female globular and erect, both occurring in pairs in the axils of the leaves or leaf scars

The Juice as a Cement—§ 'The concreted juice forms a waxy tough light brown substance which when melted is used as a cement to join broken earthenware and stoneware (Surgeon Major W Dymock Bombay)

Food—Produces a fruit the size of a large orange which contains a pulpy substance much relished by the natives

Structure of the Wood—Wood hard to very hard yellowish brown durable seasons well Weight about 35 lbs per cubic foot

Much used on the western coast for house and ship building furniture and other purposes It is a very large and handsome evergreen tree whose massive trunk occasionally rises straight and clean stemmed for 150 feet It yields the Anjeli wood of commerce and is equally valuable for ship and house building A seasoned cubic foot weighs 40 lbs

This is an excellent wood for making boxes buildings and furniture generally and like its congeners as ornamental as it is useful (Tropical Agriculturist II p 883)

1486**Artocarpus incisa, Linn**

THE BREAD FRUIT TREE of the South Sea Islands

Vern—*Rata del* (or the foreign *del*) SINGH

Habitat—Cultivated in South India Ceylon and Burma Succeeds well in Bombay a few good trees may be seen in the garden attached to the Albert and Victoria Museum In Bengal the winter proves too severe for its growth (Roxburgh) Cultivated in the islands of the Asiatic Archipelago from Sumatra to the Marquesas Islands when Europeans first began to visit them It is probably a native of Java Amboyna and the neighbouring islands (DeCandolle L Origin Cult Pl 238)

Recently efforts have been and are continuing to be made by the Agri Horticultural Society of Madras to establish and distribute the edible (seedless) varieties of this tree in Southern India A large tree already flourishing in the garden of the late Sheriff of Madras has afforded the basis for propagation and a stock of good sorts has been procured from Ceylon The tree propagates by suckers or offshoots from the base of the stem rather than by cuttings When the fruit is of good quality it rarely produces fertile seeds

Botanic Diagnosis—Leaves pinnatifid Male heads cylindric female terminal round (Roxburgh)

Gum—Yields gum

FRUIT
1487**GUM**
1488
1489**A. integrifolia, Linn**

THE JACK FRUIT TREE (A name said by DeCandolle, in *L Orig Cult Pl*, to be derived from a common Indian name *jaca* or *tsjaka*)

Vern—*Kanthál katol káthal chakki panasa panas* HIND *Kánthal káthál* BENG; *Knáthál* ASS *Kanthar*, *SANTAL* *Poros* KOL; *Panasa* URIYA *Phanas* MAR BOMB *Pila, pildpasham* TAM *Panasa-pandu panasa víru-panasa* TEL *Halsu, heb-holsu, halsina* KAN *Teprong* GARO *Panasa* SANS *Peingnai pienné*, BURM Cos SINGH

A. 1489

The Jack-fruit Tree.

ARTOCARPUS
integrifolia.

Habitat.—A large tree cultivated throughout India and Burma except in the north. Supposed to be wild in the mountain forests of the Western Ghâts ascending to 4,000 feet (*Bombay Gazetteer*). Its dome of dark foliage with the stem burdened with monster fruits (often 2½ feet in length) is perhaps one of the most characteristic features of the Indian village surroundings.

It is both cultivated and found wild in the evergreen Sahyadri forests (*Bombay Gazetteer* Vol XV 62). It is also wild in the Eastern Ghâts (*Central Provinces Gazetteer* p 503). "Grows freely on the Eastern Ghâts Rakhphalli taluka (*Central Provinces Gazetteer* p 503).

CULTIVATION — A pit is dug and filled with cowdung and in this the jack seed is inserted in June or July. The cost of cultivation is nil whilst the profits vary from 4 annas to Rs 2 per tree realized by the sale of the fruit (*McCann's Dyes and Tans of Bengal*). The value of a jack tree in Surat is about Rs 15 per annum (*Bombay Gazetteer* II 41). DeOandolle thinks that the cultivation of this tree is probably not earlier than the Christian era. It was introduced into Jamaica by Admiral Rodney in 1782. It has also been introduced into Brazil, Mauritius &c (*L Orig Cult Pl* 240).

Botanic Diagnosis.—Glabrous or the young shoots with short stiff hairs branchlets with annular raised lines the scars of the caducous stipules. Leaves coriaceous smooth shining above rough beneath elliptic or obovate obtuse mid rib prominent beneath with 7-8 lateral nerves on either side 4-8 inches stipules large with a broad amplexicaul base caducous. Fruit large hanging on short stalks oblong fleshy with a thick cylindrical receptacle rind muricated. Seeds reniform oily.

Gum.—The bark yields a very dark looking gum with a resinous fracture soluble in water (*Atkinson's Gums and Resins*). The juice is used as a valuable bird lime and as a cement.

A writer in the *Indian Agriculturist* describes certain experiments with the caoutchouc from this plant. He says it is elastic leathery water resisting and capable of removing pencil marks but as remarked by the Editor although the order *Artocarpæ* of course yields caoutchouc it is still a question which experiment alone can decide whether rubber of sufficient economic value could be obtained from this species. Each fruit yields about two ounces of milk from which according to the writer in the *Indian Agriculturist* a drachm and a half of the caoutchouc like substance can be obtained.

Dye.—The wood or its sawdust yields on boiling a decoction used as a yellow dye to colour the Burmese priest's robes and to some extent it is in requisition as an ordinary yellow dye in Madras and other parts of India and in Java. It is fixed with alum and often intensified by a little turmeric. With indigo it gives a green said to be used in Malda. *Kanthal* yellow is often used in dyeing silk. In the Midnapur district a red dye for home use is produced by boiling the juice of green jack fruits with *Ach* root and lime. With this red dye cloth and the jute used for tying bombs are dyed. Both fruit and wood are used as dyes in Bengal. According to Mr. Liotard's memorandum it would seem that a dye is extracted in Oudh from the bark and Balfour mentions that a yellow dye is obtained from the roots in Sumatra. (*McCann's Dyes and Tans of Bengal*).

Fibre.—The bark yields a fibre. A fibre extracted from the bark was sent to the Paris Exhibition from Sandoway, a cordage fibre is also obtained from the bark in Kumaon (*T N Mukarji Revenue and Agriculture Department Calcutta*).

I490

GUM.
I491CAOUTCHOUC
I492
Fruit
I493DYE.
I494
Wood
I495
Yellow
I496
Green
I497
Red
I498FIBRE
Bark.
I499

A. I499

**ARTOCARPUS
integrifolia****The Jack fruit Tree.****MEDICINE**

Juice

I500

Leaves

I501

Root

I502

Fruit unripe

I503

Fruit ripe

I504

Fruit

I505

Spirit

I506

Seeds

I507

Flour

I508

Medicine—The juice of the plant is applied externally to glandular swellings and abscesses to promote suppuration. The young leaves are used in skin diseases and the root internally in diarrhoea.

§ This is an important article of food both when green as well as when ripe. The seeds contain a quantity of starchy matter which may be separated by drying and pounding them. The unripe fruit is astringent the ripe laxative but rather difficult to digest although very nutritious. The juice of the plant is used to promote absorption of glandular swellings. (*Surgeon D Basu Faridpur Bengal*)

Food—The large fruit obtained from this tree would be more correctly described as a fruitescence since like the pine apple it is an aggregation of the fruits produced by an assemblage of flowers. The individual fruits are often spoken of as flakes they each consist of a seed surrounded by a pulpy mass of luscious tissue having a strong odour. The external rough skin of the fruitescence is rejected and the yellow pulpy mass which surrounds the seeds eaten by the natives of India and by them regarded as one of the best Indian fruits. It is seldom eaten by Europeans. The average size of the fruit is from 12 to 18 inches long by 6 to 8 inches in diameter. Each contains from 50 to 80 or more flakes of a soft juicy and sweet substance which if fermented and distilled yields an alcoholic beverage with a strong odour and peculiar flavour.

The seed when roasted is eaten as an article of food and is said to resemble chestnuts. When ground to flour it very much resembles the Kashmir Singara nut flour. A writer in the *Indian Agriculturist* says

I believe it contains a very large percentage of starch and as such could be utilized in a variety of forms. If these seeds be taken to weigh a third of an ounce each one fruit will give us 30 ounces of flour and 20 fruits the produce of one tree 600 ounces=37 lbs of flour.

The fruit weighs up to 60 lbs and is much used by the people. The roasted seeds are not unlike chestnuts and are in bad seasons often the only food of the poorest hill people. (*Bombay Gazetteer Vol XV Pt I 62*)

§ The fruit when unripe is cut into small pieces and cooked in curry with shrimps. The seeds of the ripe fruit when roasted in hot ashes are very palatable and nutritious and in taste resemble somewhat the Spanish chestnuts. (*Mr L Liotard Calcutta*)

The strong unpleasant odour of the ripe jack fruit is probably due to the presence of butyrate of ethyl. (*Surgeon C J H Warden Calcutta*)

Structure of the Wood—Heartwood yellow or rich yellowish brown darkening on exposure compact even grained moderately hard seasons well and takes a fine polish. Weight about 40 lbs per cubic foot.

It is largely used for carpentry boxes and furniture and is exported to Europe for cabinet work turning and brush backs.

The trunk grows to a great girth. The wood is yellow when cut but gradually darkens. It becomes beautifully mottled with time and takes as fine a polish as mahogany. A seasoned cubic foot weighs 42 lbs. It is used for building and for furniture. (*Bombay Gazetteer Vol XV Pt I 62*) Mr Gibson says this is a useful firewood tree found in Thana growing in salt marshes. The jack trees in Bengal attain a great girth but are not very lofty. Planks 20 or 24 inches across are often sawn out of jack tree bolls. An average tree ceases to yield fruit when it has reached a circumference of 9 feet, and may at that time be sold at Rs 20 (*Indian Agriculturist*). According to the *Tropical Agriculturist* large jack trees will sell for as much as Rs 100 each they are used for canoes.

§ "Jack wood is yellow hard takes an excellent polish, is beautifully

TIMBER**I509**

Cuckoo-pint or Aroid

ARUM

marked and is one of the handsomest furniture woods found in the country (*Surgeon C & H Warden, Prof of Chemistry Calcutta*)

Sacred—*Artocarpus integrifolia* is often seen on Buddhistic sculptures In some instances it appears to have been mistaken for the custard apple (See remarks under *Anonaceae*)

1510

Artocarpus Lakoocha, Roxb

1511

Vern—*Tiun tiun dheu daheo* PB *Dahu dhau barhal lakuch dhévd* HIND *Lovs BOMB DUK Votamba* MAR, *Vonte KAN, Dhao* KUMAON *Dephal dahu dehua lakucha madar* BENG *Dahu SAN* TAL KOL *Dewa chama chambá ASS Dawa CACHAR Barror* NFPAL *Kamma r gu lakuchamu nakka renu TEL Lakucha SANS* *Myauklouk myauklót or mi auk tok BURM Cawnagona etaheraliya* SINGH

Habitat—A large tree met with in the outer hills of Kumaon Sikkim Eastern Bengal Burma and in the evergreen forests of the Western Ghats and Ceylon

Botanic Diagnosis—Branchlets and under side of the leaves with short soft grey tomentum not marked by the scars of the stipules as in *A. integrifolia* Leaves coriaceous oval or ovate obtuse or shortly acuminate entire blade 6-10 inches Flower heads globose axillary the male subsessile the female shortly pedunculate Fruit acid of an irregular roundish shape 3-4 inches in diameter velvety yellow when ripe

Caoutchouc—A caoutchouc similar to that obtained from the preceeding species is derived from this plant

Dye—The root yields a yellow dye Wood used in dyeing cloth yellow (*Burm Gaz I 138*)

Fibre—A fibre is prepared from the bark used for cordage

Food—It flowers in March and produces a fruit which is eaten by the natives The male spadix is used in curry and also pickled Mr Mann says the bark is chewed in Assam as a substitute for betel nuts

The fruit is eaten in curries in Kanara (Bombay) (*Bombay Gasetteer Vol XV Pt I 62*)

Structure of the Wood—Sapwood large white soft perishable Heartwood yellow hard It seasons well and takes a good polish Weight 30 to 50 lbs per cubic foot

Used for furniture and canoes

CAOUTCHOUC

1512

DYE

1513

FIBRE

1514

FOOD

1515

TIMBER

1516

A. nobilis, Thw Enum, Ceylon Pl, 262

1517

Vern—*Del aludel* SINGH

Habitat—A large tree of Ceylon

Food—The seeds are roasted and eaten by the Singhalese

Structure of the Wood—Heartwood shining moderately hard pores filled with a white substance giving the wood an elegant mottled appearance

Used for canoes and furniture

FOOD

Fruit

1518

TIMBER

1519

ARUM, Linn Gen Pl, III 967 Engl in DC., Mono Phaner II, 580

1520

A genus of herbaceous plants with tuberous corms, often edible belonging to the Natural Order AROIDEÆ The genus comprises some 20 species inhabitants of Europe the Mediterranean region and tropical Asia, extending from India to Afghanistan

Leaves sagittate or hastate base of the petiole sheathing Peduncles most frequently solitary short or long Spathe-tube convolute blade when opened out ovate or ovate-lanceolate spadix sessile shorter than the spathe appendix

A. 1520

**ARUM
speciosum****Aroids**

naked frequently stalked and cylindrical rarely clavate *Inflorescence* monocious perianth none 1 *Female flowers* below forming a cylindrical mass separated from the male by a tuft of hair like neuter flowers which blend above into the male condition *Stamens* 3 4 *anthers* sessile opposite or sub-opposite obovoid dehiscing by a slit towards the apex connective more or less prolonged pollen vermiform *Ovary* oblong-obtuse 1 locular *stigma* sessile *ovules* 6 or many, orthotropous erect *funiculus* short *placenta* parietal 2 3 seriate *micropyle* superior *Fruit* an obovoid many-seeded berry

The generic name is derived directly from ἀρον Gr aros aron arum Latin=the Cuckoo-pint Some authors regard the Greek word however as derived from the Hebrew *Or* fire or flame probably referring to the burning or acrid character of the plants or to the scarlet head of fruits

Arum campanulatum, Roxb Syn for *Amorphophallus campanulatus, Bl*

A Colocasia, Willd ; Syn for *Colocasia antiquorum, Schott* which see

A cucullatum, Lour Syn for *Alocasia cucullata, Schott* which see

A curvatum, Roxb Syn for *Arisæma curvatum Kunth* which see

A cuspidatum, Roxb Syn for *Arisæma cuspidatum, Engl* which see

A. divaricatum, Linn Syn for *Typhonium divaricatum, Dec* which see

A flagelliforme, Lodd Syn for *Typhonium cuspidatum, Dec* which see

A. fornicatum, Roxb Syn for *Alocasia furnicata, Schott*, which see

A gracile, Roxb Syn for *Typhonium gracile, Schott* which see

1521 A Griffithii, Schott *N E Brown Linnæan Soc Jour XVIII, 257*
Habitat—Afghanistan (*Griffith Aitchison Kuram Mon Valley*)

A. indicum, Roxb Syn for *Alocasia indica, Schott Engler in DC Phaner II 501*

A lyratum, Roxb Syn for *Amorphophallus lyratus*, which see

A. margaretiferum, Roxb *Dr Dymock's Mat Med West Ind 664*
Syn for *Plesmonium margaretiferum, Schott Engler DC Mono Phaner p 303* which see

A montana, Roxb Syn for *Alocasia montana, Schott* which see

A. nymphaeifolium, Roxb Syn for *Colocasia Antiquorum, Schott*
VAR *nymphaeifolia*, which see

A. odorum, Roxb Syn for *Alocasia odora C Koch* which see

A. orixense, Roxb Syn for *Typhonium trilobatum, Schott* which see

A. rapiforme, Roxb Syn for *Alocasia rapiformis, Schott* which see

A sessiliflorum, Roxb *N E Brown Linnæan Soc Jour XVIII 256*
Wight Ic t 800 the loth of Dr Dymock's Materia Medica of Western India a Syn for *Sauromatum sessiliflorum, Kunth* which see.

A. speciosum, Wall *Stewart's Pb Pl*, Syn for *Arisæma speciosum Mart. N E. Brown, Linn. Soc Jour., XVIII, 249* which see.

A. 1521

| Small Himálayan Bamboos | ARUNDINARIA racemosa. |
|---|--------------------------|
| Arum silvaticum , <i>Roxb</i> Syn for <i>Synantheris silvatica</i> , <i>Schott</i> which see | |
| A trilobatum , <i>Willd</i> in <i>Roxb</i> Syn for <i>Typhonium divaricatum</i> , <i>DC</i> | |
| A tortuosum , <i>Wall</i> <i>Stewart's Pb Pl</i> , Syn for <i>Airssama tortuosum</i> <i>Schott Engler DC Mono Phaner II 545</i> which see | |
| A. viviparum , <i>Roxb</i> Syn for <i>Remusatia vivipara</i> , <i>Schott</i> | |
| ARUNDINARIA , <i>Mich Gen Pl III 1207</i> | 1522 |
| (Compare with Bamboo and also the definition given under Bambuseæ) | |
| Arundinaria falcata , <i>Nees Duthie's List of Grasses 46</i> GRAMINEÆ HIMÁLAYAN BAMBOO | 1523 |
| Vern — <i>Nirgal nirgal ringál nagre narri garri gero narkat narqual</i> HIND <i>Spiaḡ gurwa spikso pitso</i> KANAWAR <i>Kwei</i> THIBET <i>Prong</i> N W P <i>Tutinigala</i> NEPAL <i>Prongnok</i> LEPCHA | |
| Habitat —Met with from the Ravi to Bhutan above 4 500 feet in al- titude in the western but descending nearly to the plains in the eastern Himálaya | |
| Fibre —The leaves are used for roofing and baskets | FIBRE. |
| Structure of the Stems —Six to 10 feet high strong annual used for roofing and baskets | 1524 Stem |
| A Falconeri , <i>Benth & Hook f Brandis For Fl 563</i> | 1525 |
| Syn —THAMNOCALAMUS FALCONERI <i>H f</i> | 1526 |
| Vern — <i>Ringal</i> | |
| Habitat —Deoban to Simla (<i>Brand</i>) Kumaon 7 000 to 8 500 feet, (S and W) Nepál (<i>Wall</i>) (<i>Duthie's List of Grasses 46</i>) | |
| A Griffithiana , <i>Munro</i> | 1527 |
| Habitat —Met with in the Khasia Hills | |
| Botanic Diagnosis —Stems 4 to 6 feet high internodes woolly some times prickly | |
| A Hookeriana , <i>Munro</i> | 1528 |
| Vern — <i>Praong prong</i> LEPCHA <i>Singhan</i> NEPAL | |
| Habitat —A bamboo with stems 12 to 15 feet in height common about Dumsong frequent in Sikkim at 4,000 to 7 000 feet in altitude (<i>Gamble</i>) | |
| Food —The seeds are edible | FOOD |
| A. intermedia , <i>Munro</i> | 1529 |
| Habitat —Sikkim from 7 000 to 8 000 feet stem from about 6 to 8 feet | 1530 |
| A khasiana <i>Munro</i> | 1531 |
| Vern — <i>Namlang</i> KHASIA | |
| Habitat —Met with in Khásia Hills stem from 8 to 12 feet. | |
| A. racemosa , <i>Munro</i> | 1532 |
| Vern — <i>Pummoon</i> , LEPCHA <i>Pat-hoo maling</i> NEPAL <i>Myooma</i> BHUTIA | |
| Habitat —A bamboo 2 to 4 feet high, with blueish rough internodes occurring in Sikkim and Nepal above 6,000 feet | |

**ASAGRÆA
officinalis****Cevadilla or Sabadilla.****FIBRE
Mats.****1533****FODDER.****1534****1535**

Fibre and Timber — It is extensively used for making mats and roofing &c An important fodder plant

Arundinaria spathiflora, Trin

Syn — *THAMNOCALAMUS SPATHIFLORUS* Munro Brandis For Fl 635
Vern. — *Ringál*

Habitat — Hattu near Simla 8 400 feet Deoban range 8 000 feet (Brand) Garhwál 8 500 feet Kumaon (Falc) Nepal (Duthie's List of Grasses p 46)

1536

A. Wightiana, Nees

THE NILGHIRI AND WESTERN GHAT HILL BAMBOO

Vern — *Chevari BOMB Dals & Gibs Bomb Fl 299 Brandis 563*

TIMBER.**1537**

Timber — A most useful Bamboo yielding the walking sticks of Mahableshwar young stems are also eaten

ARUNDO, Linn Gen Pl III, 1179

1538

Arundo Donax, Linn GRAMINEÆ

Syn — *DONAX ARUNDINACEUS Beauv A BENGALENSIS Retz*

Vern — *Sukna HOSHIARPUR*

Habitat — Plains of the Panjab and North Western Provinces also the lower Himálaya (Duthie's List of Grasses 35)

A Epigejos, Linn **Syn** for *Calamagrostis Epigejos, Roth* which see

A. Karka, Roxb **Syn** for *Phragmites Roxburghii, Kunth* which see.

1539

A madagascariensis, Kunth

Syn — *DONAX THOUARII Beauv*

Habitat — The Panjab Himalaya ascending to 8 000 feet in altitude

1540

A mauritanica, Desf

Syn — *A PLINIANA Tur A PLINII Vison PHRAGMITES GIGANTEA Gay*

Habitat — North West Himalaya

A Phragmites, Linn **Syn** for *Phragmites communis, Trin* which see

Asafoetida, see Ferula Nartex, Boiss UMBELLIFERÆ

ASAGRÆA, Lindl (Reduced to Schoenocaulon) Gen Pl, III 836

1541

Asagræa officinalis, Lindl LILIACÆ

CEVADILLA OF SABADILLA.

Syn — This plant has received various names — *VERATRUM OFFICINALIS, HELONIAS OFFICINALIS* and *SCHÆNOCAULON OFFICINALE* but as it is not an Indian plant it has been thought the more convenient course to leave it for the present under *ASAGRÆA* its best known synonym

Habitat — A native of Mexico imported into India

Medicine — Chiefly used in the preparation of the alkaloid Veratria obtained from decoction of the seed is useful externally to destroy pediculi (See *U S Dispens 15th Ed, 1252 and 1515*)

Chemical Composition — *Veratria*, the active principle of sabadilla, is usually found in commerce as an amorphous, odourless, pale-grey

MEDICINE.**Veratria.****1542****Seeds****1543**

A. 1543

The Asarabica or Foalfoot.

ASARUM
europæum

powder often containing a large percentage of resin The taste is highly acid and bitter and when inhaled through the nostrils causes most painful and prolonged irritation Veratria has been shown to be capable of existing in two isomeric modifications the one soluble and the other insoluble in water The alkaloid has been obtained in a crystalline form Two other alkaloids have been isolated from the seeds namely, *sabadilline* and *sabatrine* Two volatile crystalline acids *sabadillic* and *veratric* acids are also contained in the seeds (*Surgeon C F H Warden Calcutta*)

ASARUM, Linn Gen Pl III 122

1544

A small genus belonging to the Natural Order ARISTOLOCHIACEÆ
Leaves reniform *Flowers* solitary drooping bell-shaped 3 fid appearing from between two opposite leaves *Stamens* 12 inserted at the base of the style *anthers* attached to the middle of the filaments *Stigma* 6-lobed *Cap-sule* 6-celled

Asarum europæum, Linn

1545

COMMON ASARABICA, ASARABACCA OF FOALFOOT Eng CABA
 RET OF ASSARET Fr HASELKRANT Ger (Balfour)

Vern.—*Taggar tagar* HIND *Upana SANS* *Asárun* ARAB; *Mutri knujayie* () TAM *Chepututaku* (?) TEL *Tagara* BOMB CUTCH

Habitat—Indigenous to temperate Europe and North Asia

History—This plant has been used in medicine from very ancient times Ainslie in his *Materia Medica* states The appellation *Asarum* which has been given to this article by the Arabs and the Mahometan conquerors of India *Moomina* informs us was first bestowed on it by the Syrians in whose country the plant at one time plentifully grew All parts of the plant are acrid but those used in medicine are the roots and the leaves chiefly the latter

1546

Description—In the *U S Dispensatory* the root is described as thick as a goose-quill of a greyish colour quadrangular knotted and twisted and sometimes furnished with radicles at each joint It has a smell altogether analogous to that of pepper an acrid taste and affords a greyish powder The leaves are kidney shaped entire somewhat hairy of a shining deep green colour when fresh nearly inodorous with a taste slightly aromatic bitter acrid and nauseous Their powder is yellowish green

1547

Chemistry—It is further stated that in an analysis made by *Grager* the root was found to contain a liquid volatile oil two concrete volatile substances called respectively *asarum camphor* or *asarone* and *asarite* a peculiar bitter principle called *asarin* tannin extractive resin starch gluten albumen, lignin citric acid and various salts In the leaves he found *asarin* tannin extractive chlorophyll albumen citric acid and lignin

1548

Medicine.—Both the ROOT and the LEAVES were formerly much used in Europe as a powerful emetic and cathartic the dose being 30 grains to a drachm, but as an emetic they have now been entirely superseded by *ipecacuanha* They are now used only as an errhine "One or two grains of the powdered root snuffed up the nostrils produce much irritation and a copious flow of mucus for several days until the desired effect is produced The leaves are milder and generally preferred They should be used in the quantity of three or four grains repeated every night until the desired effect is experienced They have been strongly recommended in headache chronic ophthalmia, and rheumatic and paralytic affections of the face mouth and throat and are in great repute in Russia as a remedy for deranged state of health consequent on habits

MEDICINE
 Root
 1549
 Leaves.
 1550

ASCLEPIADEÆ.

The Asclepiadææ

of intoxication (*U S Dispens 15th Ed p 1578*) It is however not much used in India Ainslie found that the Tamil physicians occasionally prescribed the root as a powerful evacuant; they also employ the bruised and moistened leaves as an external application round the eyes in certain cases of ophthalmia 'Irvine in his *Mat Med of Patna* says The dry plant imported from Persia is used as a stimulant Dose ʒi According to O'Shaughnessy the dried plant is sold in the Indian bazars under the name of *Asarun* Royle states however that a hill plant called *Tuggur* is generally substituted for it This is most probably *Valeriana Hardwickii*, for which *Asarun* and *Tagar* are Hindi names

§ Tonic and antiperiodic applied locally to indolent ulcers" (*Surgeon W Barren Bhuj, Cutch*)

1551

Asbestos or Asbestos

Vern —§ *Shankha palita* MAR (literally wick made of shells)

A fibrous mineral now viewed as a variety of Hornblende allied to augite tremolite and clinochlore in which the proportion of alumina is less than usual It contains a considerable quantity of magnesia and is found in connection with serpentine There are many varieties of asbestos one in which the fibres are so long and flexible as to admit of being woven into cloth This form is generally known as *Amianthus*

MEDICINE

1552

DOMESTIC

1553

Medicine —§ Found in the Gokak Taluka in the Belgaum district in the Southern Maratha country where it is used as an external application in ulcers made into a paste after rubbing it down with water used especially in syphilitic ulcers (*Surgeon Major C T Peters South Afghanistan*)

Is obtainable in large quantities in the country to the south and west of the Kurum river Afghanistan used as medicine and made into brooms and rough ropes and padding for saddles (*Surgeon Major J E T Atchison, Simla*)

Ropes

1554

1555

ASCLEPIADEÆ

"Herbs or shrubs usually twining Leaves opposite or obsolete very rarely alternate quite entire exstipulate Inflorescence various usually an axillary umbelliform cyme flowers regular hermaphrodite 5 merous Calyx inferior lobes or segments imbricate Corolla lobes or segments valvate or overlapping to the right very rarely to the left tube or throat often with a ring of hairs scales or processes (the outer or *corolline corona*) Stamens at the base of the corolla filaments free in *Periploceæ*, with or without interposed glands in other tribes connate into a generally very short fleshy column which usually bears a simple or compound ring or series of scales or processes (inner or *staminal corona*) that are attached to the filaments or to the back of the anthers or to both anthers crowning the column connate or free adnate by the connective to the stigma, 2-celled tip often produced into an inflexed membrane pollen forming one or two granular or waxy masses in each cell the masses united in pairs or fours to a gland (*corpuscle*) which lies on the stigma. Ovary of two distinct superior carpels enclosed within the staminal column styles 2 short uniting in the stigma which is 5 angled short and included between the anthers or is produced beyond them into a long or short simple or 2 fid column ovules many rarely few 2 seriate in each carpel Fruit of 2 follicles Seeds compressed usually flat ovoid winged and surmounted with a dense long brush of hairs (*coma*) (absent in *Sarcobolus*) albumen copious dense; embryo large, cotyledons flat, radicle short, inferior Distrib —Species about 1000, chiefly tropical

"The analysis of the plants of this order is most difficult, and in dried

A. 1555

The Asclepiadeæ.

ASCLEPIADEÆ.

specimens never satisfactory from the fleshiness and complexity of the coronal processes and anthers. I have spent many months over the Indian ones and have kept pretty close to the generic limits adopted in the *Genera Plantarum*. I have however been obliged to abandon the tribe *Stapeliceæ*, to suppress *Vincetoxicum*, and to propose several new genera.

SUB ORDER I—PERIPLOCEÆ.

Filaments usually free anthers acuminate or with a terminal appendage pollen masses granular in pairs in each cell

TRIBE I Periploceæ

Characters of the Sub-order

- * Coronal scales or processes 0
- Anthers with bearded appendages 1 *Pentanura*.
- ** Coronal scales corolline free short thick
- Corolla very small rotate lobes valvate 2 *Hemideamus*
- Corolla small rotate lobes overlapping 3. *Cryptolepis*
- Corolla large funnel shaped lobes overlapping *3 *Cryptostegia*
- *** Coronal scales 5 free close to or adnate to the filaments
- † Coronal scales short broad filaments without interposed glands
- A pubescent twining shrub leaves opposite 4 *Brachylepis*
- An erect tree leaves alternate 5 *Utleria*
- †† Coronal scales filiform or subulate
- (a) Filaments free without interposed glands
- Cymes stout pubescent Corolla lobes short broad 6 *Finlaysonia*
- Cymes slender glabrous Corolla lobes slender straight 7 *Atherostemon*
- (β) Filaments free with interposed teeth or glands
- Cymes slender glabrous Corolla lobes short triangular 8 *Atherolepis*
- Cymes slender glabrous Corolla lobes long slender 9 *Atherandra*
- Cymes short sessile Corolla lobes short ovate 10 *Streptocaulon*
- Cymes loosely paniced Corolla lobes lanceolate 11 *Myriopteron*.
- ††† Coronal scales short broad filaments connate with interposed glands
- Cymes peduncled Corolla lobes ovate valvate 12 *Decalepis*.
- **** Coronal scales connate into a lobed ring filaments without interposed glands
- Corolla rotate lobes overlapping 13 *Periploca*.

SUB ORDER II—EUASCLEPIADEÆ

Filaments connate pollen masses waxy

TRIBE II Secamoneæ.

- Anthers with a membranous inflexed tip pollen masses in pairs in each cell (20 in all) sessile in fours (2 pairs) on the corpuscle
- Corolla rotate lobes overlapping to the right 14. *Secamone*.

ASCLEPIADEÆ.

An Analysis of the

- Corolla rotate lobes overlapping to the left 15 *Toxocarpus*.
 Corolla rotate, lobes valvate 16 *Genianthus*.

TRIBE III *Cynanchææ*.

Anthers with a membranous inflexed tip pollen masses solitary in each cell (10 in all) Sessile or pedicelled in pairs on the corpuscle pendulous.

- * Corona single corolline 5 cleft 17 *Glossonema*.
 ** Corona double corolline and staminal 18 *Oxystelma*.
 *** Corona staminal of 5 processes adnate to the anthers or O

† *Stem erect*

- Corolla valvate Coronal processes laterally compressed 19 *Calotropis*
 Corolla valvate Coronal processes spatulate *19 *Asclepias*.
 Corolla lobes overlapping Coronal processes short fleshy 20 *Pentabothra*.

†† *Stem twining Corolla lobes overlapping*

- Corolla campanulate Coronal processes ligulate 21 *Raphistemma*
 Corolla rotate Coronal processes laterally compressed 22 *Pentatropis*.
 Corolla funnel shaped Coronal processes laterally compressed 23 *Dæmia*
 Corolla campanulate Coronal processes O 24 *Adelostemma*

- **** Corona single staminal cupular or annular Corolla rotate
 Corona of a 10-lobed ring and 5 horny processes behind the anthers 25 *Holostemma*.
 Corona annular Leafy erect or twining herbs 26 *Cynanchum*
 Corona annular Leafless straggling shrubs 27 *Sarcostemma*

TRIBE IV *Marsdeniææ*

Anthers with a membranous inflexed tip (absent in *Physostelma* and rarely in *Hoya*) pollen masses solitary in each cell (10 in all) sessile or pedicelled in pairs on the corpuscle erect (rarely horizontal or pendulous in *Tylophora*)

- * Corolla lobes overlapping Corona O or corolline
 Stem twining Corolla lobes short Corona O 28 *Sarcolobus*.
 Stem pendulous Corolla lobes long Stigma included 29 *Pentasacme*.
 Stem twining Corolla lobes short Corona on the corolla tube 30 *Gymnema*.
 ** Corolla lobes overlapping Coronal processes on the staminal column rarely O

† *Corolla urceolate campanulate or salver-shaped*

- Corolla urceolate Coronal processes minute or O Stigma included 31 *Gongronema*.
 Corolla urceolate or salver shaped Coronal scales on the back of the anthers simple 32 *Marsdenia*
 Corolla rotate or salver shaped Coronal scales on the back of the anthers notched 33 *Pergularia*.
 Corolla salver shaped coriaceous Coronal scales O (in Indian species) 34 *Stephanotis*.
 Corolla-lobes long, doubled down inwards in bud 35 *Lygiaena*.

Asclepiadaceæ

ASCLEPIADEÆ.

†† *Corolla rotate*

- Cymes various Column minute Coronal processes fleshy 36 *Tylophora*
 Cymes umbelliform Column large coronal processes simple 37 *Treutlera*.
 Cymes racemiform Column minute fleshy coronal processes 2 fid 38 *Cosmostigma*
 Cymes umbelliform pendulous Coronal scales spreading cuspidate 39 *Dregea*.
 *** Corolla valvate Coronal processes adnate to the staminal column
 Corolla small rotate Column short corona stellate Follicles slender 40 *Heterostemma*
 Corolla large rotate Column short corona stellate Follicles stout 41 *Dittoceras*
 Corolla urceolate or disciform Corona cupular fleshy 42 *Oianthus*
 Corolla minute urceolate Coronal scales membranous erect 43 *Dischidia*
 Corolla rotate Corona very large stellate 44 *Hoya*
 Corolla cupular Corona large stellate 45 *Physostelma*
 Corolla tube short lobes long subulate Ovary sunk in the calyx tube 46 *Pycnorhachis*

TRIBE V *Ceropegieæ*

Anthers incumbent on the stigma without a membranous tip pollen masses one in each cell (10 in all) sessile in pairs on the corpuscle erect or horizontal Corolla lobes valvate in all

Corona double corolline lining the corolla tube and forming minute processes in the sinus of its lobes staminal annular

- Calyx turbinate 5 lobed Corolla rotate 47 *Leptadenia*.
 Calyx 5 partite Corolla salver-shaped 48 *Orthanthera*.

** Corona staminal simple or compound annular 5 10 lobed with 5 processes from its inner face which overlap the anthers

† *Leafy herbs with terete stems and branches*

- Corolla rotate lobes very narrow Stem very slender, erect or twining 49 *Brachystelma*
 Corolla tube long Stem stout or slender erect or twining 50 *Ceropegia*.
 Corolla rotate, stem erect and branches short stout fleshy 51 *Frerea*.

†† *Leafless herbs with fleshy 4-angled stems and branches*

- Corolla rotate lobes very narrow Flowers lateral sub-solitary 52 *Caralluma*.
 Corolla rotate lobes very broad Flowers terminal umbelled 53 *Boucerosia*.

Genus known by name only *Odonanthera*, *Wight in Lindl Veg Kingd.*, 626 (*Flora of British India IV pp 14*)

Distribution of the Indian Species.—There are a little over 1000 species belonging to this order known in the whole world and they are mostly confined to tropical regions 245 species are described in the *Flora of British India* Of these a few are introduced and cultivated in the plains, and one or two are doubtful species. Excluding these

1556

ASCLEPIADÆ.**The Asclepiadæ**

we have 236 Dividing India into four sections the following indicates the distributions of the Indian species —

I — **NORTH INDIA** — The Panjáb Sind and the North West Provinces and the corresponding frontier mountainous tracts, in all 18 species, or 7.62 per cent

These may be still further classified —

| | | |
|-----|---------------------------------------|----------|
| A { | Confined to the plains | 12 |
| | Ascending to from 2 000 to 5 000 feet | 3 |
| | Ditto do 5 000 to 10 000 feet | 3 |
| | | <hr/> 18 |

Of this number 7 are distributed into Afghánistan or Persia and one not met with in Afghánistan finds its way however into Spain

II — **WEST INDIA** — Bombay and the greater part of Central India and of the Central Provinces —

| | | |
|-----|---------------------------------------|----------|
| B { | In the plains | 30 |
| | Ascending to from 2 000 to 4 000 feet | 5 |
| | | <hr/> 35 |

This is about 14.83 per cent

III — **EAST INDIA** — Bengal Assam Burma and Malacca —

| | | |
|-----|---------------------------------------|-----------|
| C { | In the plains | 77 |
| | Ascending to from 2 000 to 5 000 feet | 28 |
| | Ditto do 5 000 to 10 000 feet | 13 |
| | | <hr/> 118 |

This is about 50 per cent

IV — **SOUTH INDIA** — Madras, Hyderabad Mysore and Ceylon —

| | | |
|-----|---------------------------------------|----------|
| D { | In the plains | 23 |
| | Ascending to from 2 000 to 5 000 feet | 16 |
| | Ditto do 5 000 to 10 000 feet | 3 |
| | | <hr/> 42 |

This is about 17.8 per cent

To these must be added a few species which are not referred to either of the above, but which occur in two or more of the provinces — in other words occur throughout India —

| | | |
|-----|---------------------------------------|----------|
| E { | In the plains | 6 |
| | Ascending to from 2 000 to 5 000 feet | 8 |
| | Ditto do 5 000 to 10 000 feet | 4 |
| | And ascending 9,000 to 12 000 feet | 5 |
| | | <hr/> 23 |

This gives about 9.74 per cent but none of this last class find their way into the Afghán Panjáb frontier nor are distributed into Afghánistan

We thus learn from the analysis of the Indian ASCLEPIADÆ that they attain their maximum in the tropical plains of Bengal and Burma (50 per cent), that Madras stands next in importance (17.8 per cent) then Bombay (14.83 per cent) and last of all the Panjáb (7.62 per cent) the drier arid tracts of the Indian division of Asia which most resemble Afghánistan containing fewest species Viewing the ASCLEPIADÆ collectively we have the following results tropical 62.7 per cent extra-tropical (or warm temperate) 25.43 per cent and temperate 11.9 per cent.

The Asparagus

ASPARAGUS
adscendens

ASCLEPIAS, Linn Gen Pl II 754

According to some authors the *Soma* plant of the Sanskrit authors is a species of ASCLEPIAS (see under *Sarcostemma* and also in *Max Muller's History of Sanskrit Literature*)

Asclepias acida, Roxb Syn for *Sarcostemma brevistigma*, Wight & Arn which see

A. asthmatica, Willd Syn for *Tylophora asthmatica*, Wight & Arn which see

A. curassavica, Linn ASCLEPIADEÆ

CURASSAVIAN SWALLOW-WORT OF WEST INDIAN IPECACUANHA

Vern—*Kāktundi* Pb *Kuraki kakatundi* BOMB

Habitat—Indigenous in the West Indies but quite naturalised in India Found as a weed in Bengal and various parts of India

Medicine—The root of this plant possesses emetic properties and hence the West Indian colonists gave to it the name of *Bastard* or *Wild Ipecacuanha* The expressed juice of the leaves acts successfully as an anthelmintic It is also sudorific The juice of the flowers is said to be a good styptic

In Jamaica it is called blood flower owing to its efficacy in dysentery The root is regarded as purgative and subsequently astringent It is also a remedy in piles and gonorrhœa. (*Ainslie Baden Powell Panjab Products I 361*)

According to the *U S Dispensatory* the root and expressed juice are emetic and also cathartic The juice has been strongly recommended as anthelmintic and according to *Dr W Hamilton*, it is useful in arresting hæmorrhages and in obstinate gonorrhœa The medicine is however somewhat uncertain in its operation (*U S Dispensatory 15th Ed p 1579*)

A. gigantea, Roxb Syn for *Calotropis gigantea*, R Br which see

A. laurifolia, Roxb Syn for *Gemanthus laurifolia*, Hook f which see

A. pseudosarsa, Roxb ; Syn for *Hemidesmus indicus*, Br which see

A. rosea, Roxb Syn for *Brystelma esculentum*, Br which see

A. tenacissima, Roxb ; Syn for *Marsdenia tenacissima*, Wight & Arn

A. tinctoria, Roxb Syn for *Marsdenia tinctoria*, Br which see

A. tingens, Buch Syn for *Gymnema tingens*, Wight & Arn which see

A. tunicata, Willd Syn for *Cynanchum pauciflorum*, Br which see

A. volubilis, Linn f, (*Willd in Roxburgh*), Syn for *Dregea volubilis*.

Ash, The, see *Fraxinus floribunda*, Wall OLEACEÆ

ASPARAGUS, Linn Gen Pl, III 765

Asparagus adscendens, Roxb LILIACEÆ

Syn.—A SATAWAR

Vern.—*Sufed-musli* or *sufed-musli sattuwar* HIND *Khairuma* N W P
Shaqdqule hindi, ARAB PERS and *DUK*, *Sepheta musali* *dholi musali*

A. 1562

1557

1558

MEDICINE
Root
1559
Jules.
1560
Leaves
1561

1562

**ASPARAGUS
officinalis.****The Asparagus.**

BOMB *Dhol musali saphéd-musli ugli-musli* GUJ *Saféda musali*
MAR

This is the true *Saféd musli* of commerce Dr Moodeen Sheriff first drew careful attention to the fact that various species of *Asparagus* especially *A sarmentosus*, were known as *saféd musli* but that only the roots of *A adscendens* should be regarded as the true article Dr Dymock and other more recent authors have confirmed this opinion (See *A sarmentosus*)

Habitat.—Found in Rohilkhand and other parts of India

Description.—In South India *saféd musli* is the torn and dried roots of *A sarmentosus* These pieces are however quite unlike the shrivelled and decorticated tubers of the true plant The tubers are about 2 to 2½ inches long by ¼ inch in diameter They are of an ivory white colour often twisted hairy and brittle When soaked in water they swell up and become spindle-shaped (*Dymock*)

Medicine —The tuberous roots of this species are used as a demulcent and tonic and as a substitute for *Salep* and indeed by some authors they are regarded as superior to *Salep*

Saféd musli has an agreeable mucilaginous taste it contains no starch I have used it largely as an article of diet it is far nicer than *salep* and is generally relished by Europeans To prepare it take 200 grains of the powder 200 grains of sugar pour upon them slowly a large tea-cupful of boiling milk stirring constantly all the time Bombay is supplied with *saféd musli* from Rutlam in Gujarat (*Dymock Mat Med West Ind 685*)

§ Tonic demulcent substitute for *salep misree* (*Surgeon W Barren Bhuj Cutch*)

Said to be useful in diarrhoea dysentery and general debility (*Surgeon Joseph Parker M D Poona*)

1563

MEDICINE
Saféd musli
1564

Asparagus filicinus, Ham

Vern —*Alli palli saunspaur sensar pal satnarra* PB

Habitat —Occurs frequently in the Panjáb Himalaya from 3 000 to 8 500 feet

Medicine —The root is considered tonic and astringent In Kanáwár a sprig of this is put in the hands of small pox patients as a curative measure (*Stewart*)

MEDICINE
1566

1567

A. officinalis, Willd**THE ASPARAGUS**

Vern —*Nág-doun halyun* HIND *Hillua* BENG *Halgun mar chobah margiyah* PERS *Halgun khasabul hgyah asbóra ghus* ARAB

§ *Halyun* PERS The fruit is imported from Persia (*Surgeon Major W Dymock Bombay*)

Habitat —There are several wild Indian species used by the hill people of Eastern India Indian species have climbing or trailing stems often spinose The cultivated *asparagus* of Europe is a native of several parts of Great Britain near the sea It is also very plentiful in the southern parts of Russia and Poland It is frequent in Greece and was formerly much esteemed as a vegetable by the Greeks and Romans It appears to have been cultivated in the time of Cato the elder 200 B C and Pliny mentions a form which grew in his time, of which three heads would weigh a pound (*Treasury of Botany*)

Medicine —According to Dr Monigberger the berries are used by the hakims in debility of the stomach also in liver spleen and renal disorders. They consider them to be diuretic, tonic and aphrodisiac

MEDICINE
Berries
1568

A. 1568

The Asparagus

ASPARAGUS
racemosus

properties are also ascribed to them Dr Irvine in his *Materia Medica of Patna* (p 39), says that the leaves berries and roots are used as demulcent and diuretic in native practice

The *U S Dispensatory* says The root which is inodorous and of a weak sweetish taste was formerly used as a diuretic aperient and purifier of the blood and it is stated to be still employed to a considerable extent in France It is given in the form of decoction and made in the proportion of one or two ounces of the root to a quart of water Considerable difference of opinion prevails however many authors considering that in the dried state at least the roots are wholly inert In the *BERRIS H Reinsch* has found a large proportion of glucose and a yellowish red colouring matter *Spargin* The sprouts themselves are not without effect as the urine acquires a disagreeable odour very soon after they have been eaten They have been accused of producing irritation with a morbid flow of mucus of the urinary passages

Chemical Composition—§ Asparagine was originally discovered in the juice of *A officinalis* but it has since been shown to exist ready formed in the juice of a large number of plants It is especially abundant in the form of shoots developed in germination of leguminous seeds and is found widely diffused in plants (*Graham*) Asparagine forms some marked crystals which are nearly tasteless but which possess diuretic properties and impart a peculiar odour to the urine (*Pharmacographia* p 93) By the action of acids or alkalis asparagine is converted into aspartic acid and also by the action of hydrating agents as albuminoid substance of animal and vegetable origin It is contained in somewhat considerable quantity in best sugar molasses (*Graham*) (*Surgeon C F H Warden Prof of Chemistry Calcutta*)

Food—The blanched lower stems of this species are extensively eaten as a vegetable all over the world and to a small extent in India although they cannot be cultivated so successfully as in Europe Indeed the asparagus chiefly seen at the Indian dinner table is imported in tins from Europe and America One of the chief recommendations to Indian grown asparagus is that it is in season when all other vegetables are out of season *Firminger* recommends that the seed be sown in August under shelter from the weather At the close of the rains the seedlings should be about 10 inches high they should then be planted in holes a foot wide and two or more deep and well watered and kept constantly moist and gradually earthed up until the end of April or the beginning of May when they will flower The flowers should be carefully cut off but the foliage should not be interfered with When the rains set in they will require no further care and in the following March may be forced for the table This is done by removing the earth carefully and covering the roots with manure

Asparagus (punjabensis, in Stewart's Punjab Plants)

Vern.—*Sensar pāl chuti kuchan sanmālī* Pb

Habitat—This plant is said to be common in parts of the plains of the Panjáb east to the Sutlej as well as in the Salt Range and on the Sutlej to 5 500 feet

Medicine—A sprig of this plant or of *A filicinus*, according to *Stewart* is put in the hands of small pox patients as a curative measure The leaves are officinal at Lahore

A. racemosus, Willd Roxb, Fl Ind Ed C B C p 291

Vern.—*Satamālī* SANS BENG *Satāwar shakakul* HIND *Satāwar* *banandan baidan* Pb *Shaquaqul e-misri* DUK *Satāwarī* Guj

A. 1575

Roots
1569

Sprouts
1570

1571

FOOD
1572

1573

MEDICINE.
1574

1575

**ASPHODELUS
fistulosus****Asphodelus.****MEDICINE
1576**

Satawari mul MAR *Shdaqul* PERS ARAB *Tannir muttan kishan gu skimai shadavari* TAM *Challa challa gaddu pilli-pichara* (fresh root) *sima shata vari* (dry root) TEL *Shatawali* MALA ; *Majjige gadde* KAN *Hatavari* SINGH

Habitat.—A climber found all over India

Medicine—The root of this plant is used medicinally as a refrigerant demulcent diuretic aphrodisiac, antispasmodic alterative anti diarrhoea tic and antidyseritic It is used chiefly as a demulcent in veterinary medicine **Baden Powell** says that it prevents confluence of small pox It is used in impotence in the form of a preserve

According to **Dr Irvine** the root is used by native physicians as a stimulant and restorative (*Mat Med Patna p 94*)

§ Not found of any use as a refrigerant (*Surgeon C F W Meadows Burrissal*)

1577**Asparagus sarmentosus, Willd**

Syn—*ASPARAGOPSIS SARMENTOSA* Kunth *Dymock Mat Med W Ind 685*

Vern—*Shagaqul* or *shakakul* ARAB PERS HIND *Satmul* BENG *Hatmul* Ass *Tilora* SIND *Shatdvari* BOMB GUJ *Safed musli* (dry split roots) DUK *Satava-ri mul satar* MAR *Kilvari, tan nir vittan kishangu tanni muttan kalangu* (fresh roots) TAM *Challa gaddalu pilli pichara* TEL *Shatavari kis hanna shatawali* MALA ; *Majjige gadde* KAN *Hatavari* SINGH *Kanyo-mi* BURM

This is erroneously called *Safed musli* in some parts of India

§ This plant *Zatar* MAR does not produce *safed musli* but the roots fresh and candied are used medicinally under the name of *satawari* The dry *safed musli* of the bazar is quite a different article probably from *Asparagus adscendens* (*Surgeon Major W Dymock Bombay*) The native names of the fresh roots of *A racemosus* and of *A sarmentosus* are in Madras almost the same (*Honorary Surgeon Moode n Sheriff Khan Bahadur Triplicane*)

Habitat—A climber found in Upper India common in the Konkans and the Deccan

**MEDICINE
Root
1578**

Medicine—The root is simply mucilaginous but is considered nourishing and aphrodisiac Boiled with oil it is applied to cutaneous diseases

The roots of this plant are said to be used to adulterate or as substitutes for *Aconitum heterophyllum*, and are in that case sold under the name of *Atis* (*Aconitum heterophyllum*)

§ The root juice boiled with *ghee* is given to children in debility and emaciation as a cooling and nourishing medicine (*Native Surgeon Ruthnam Moodelliar Chingleput Madras*)

Direction 15 grains per dose in gonorrhoea (*Assistant Surgeon Nehal Sing Saharanpore*)

A. satawar (*Murray's Drugs of Sind*), see *A adscendens*, *Roxb*

1579**ASPHODELUS, Linn Gen Pl III, 782****Asphodelus fistulosus, Linn Wight, Ic, t 2062 LILIACEÆ**

Vern—*Pias* bokat bokat binghar by (seed) PB

Habitat—Abundant as a field weed in most parts of the plains of the Panjab, so much so near Jhelum as to be troublesome to the cultivator (*Aitchison*)

**MEDICINE
Seed
1580
FOOD
1581**

Medicine.—The seed is officinal at Lahore It is also said to be diuretic

Food—It is eaten as a vegetable in times of scarcity

A. 1581

| The Astragalus | ASTRAGALUS multiceps. |
|---|----------------------------|
| Aspidium Filix-mas , Sws, see Nephrodium Filix-mas , Richard FILICES | |
| ASPLENIUM , Linn ; Hook & Syn Filic 244 Asplenium (Anisogonium) esculentum Pr | 1582 |
| Vern.— <i>Miwana kola</i> SINGH | |
| Habitat.—A common fern from the Himalaya to Ceylon &c | |
| Food.—Dr Trimen writes me that in Ceylon this is a well known vegetable and curry stuff largely used by the natives | FOOD Vegetable. 1583 |
| Asteracantha longifolia , Nees see Hygrophilla spinosa , T And ACANTHACEÆ | |
| ASTRAGALUS , Linn Gen Pl I 506 | 1584 |
| A genus of herbs or under-shrubs belonging to the Sub-order PAPILIONACEÆ of the Natural Order LEGUMINOSÆ and in the Tribe GALEGEÆ There are in the world as estimated by Bunge 1200 species They belt the world in the north temperate zone the head quarters being in Western and Central Asia India possesses 70 species | |
| The generic name is derived from Lat Astragalus and Gr ἀστράγαλος, the ball of the ankle joint in allusion to the knotted and kneed nature of the procumbent stems of many species They are in English generally known as the milk vetches | |
| Astragalus hamosus , Linn Fl Br Ind, II, 122 | 1585 |
| Vern.— <i>Tāj e badshah katild purtuk parang</i> HIND <i>Giydhe-qaisar</i> , PERS <i>Akhil ul-malik</i> PB <i>Ikhil ul-malik asabeaul malik</i> ARAB | |
| Habitat.—An annual growing in Beluchistan Sind and the Panjab | |
| § <i>Akhil el malik</i> is imported into Bombay from Persia (Surgeon Major W Dymock Bombay) | |
| Botanic Diagnosis.—Heads peduncled dense leaflets 13 25 oblong emarginate pod long cylindrical glabrous much recurved nearly bilocular and 16- to 18 seeded (Fl Br Ind II 122) | |
| Dye.—T N Mukarji in his <i>Amsterdam Exhibition Descriptive Catalogue</i> says By dyers and calico-printers it is employed as an adjunct to dyeing substances for producing a glaze on the coloured stuffs This might be said of any member of the genus which yields gum tragacanth but it would be interesting to have this record of actual use confirmed by specimens of the gum and of the plant from which it was obtained Gum tragacanth is imported into India. | DYE 1586 |
| Medicine.—It has emollient and demulcent properties, and is useful in the irritation of the mucous membranes The pods are officinal and are ground to be mixed with plasters | MEDICINA. 1587 |
| § Is laxative and used in nervous affections made into a paste with vinegar it is employed externally in headaches It is said to be lactagogue, and to be used in catarrhal affections" (Surgeon G A Emerson, Calcutta) | |
| A. multiceps , Wall, Fl Br Ind, II, 134 | 1588 |
| Vern.— <i>Kandāra kander katar kanda pisar sarmul</i> PB; <i>Tinani didani</i> AFG | |
| Habitat.—Found in the West Himalaya, altitude 10000 to 12,000 feet, Simla, Kumaon, and Garhwāl | |
| A. 1588 | |

ASTRAGALUS
virus**Tragacanth****MEDICINE**

1580

FOOD

1590

1591

GUM

1592

MEDICINE

1593

1594

1595

MEDICINE

1596

1597

Botanic Diagnosis—Main stems not produced branchlets with densely crowded nodes flowers 1 2 together in the leaf axils usually not peduncled corolla twice as long as the calyx (*Fl Br Ind*)

Medicine—The seeds are given in colic and also for leprosy

Food—At times browsed by cattle The calyces which have a sweetish pleasant taste are said to be eaten in the Salt range by the natives

Astragalus, ? sp

Vern—*Anjira lāyī* HIND *Ans rut* ARAB *Kunjīdah* PERS *Gujar* BOMB

Gum—A gum is exported from Persia into Bombay which Dr Dymock regards as the true *Sarcocolla* of the ancients and there would seem much to favour this idea The gum is known as *ansarut* ARAB and *kunjīdah* PERS *anjira* HIND *gujar* BOMB Meer Muhammad Husein in his *Makhsan ul Adwiyā* describes the plant which yields this gum as a small thorny shrub known as *shayakah* a native of Persia and Turkistan

Medicine—For some time *Sarcocolla* was supposed to be obtained from *Penæa* (*Sarcocolla*) *mucronata*, a native of the Cape of Good Hope It is known to come from Persia and it cannot therefore be obtained from a species of *Penæa* (the so called *Sarcocolla* plants) which are found in the south of Africa Mr Baden Powell mentions *Penæa* in his *Panjāb Products* but as pointed out by Dr Dymock the gum is entirely imported into India coming from the Persian Gulf The medicinal virtues of *Sarcocolla* have long been much admired by the natives of India made either into an ointment and plaster or into a medicated oil It is one of the chief ingredients of the Parsi bone setter's plaster (*lep*) The gum is described as aperient and a solvent of corrupt and phlegmatic humours acting best when combined with myrabolans or Sagapenum It is also supposed to be fattening and is therefore eaten by the Egyptian women This exceedingly useful gum which is widely consumed in the East does not seem to have attracted the attention of Europe to the extent which it deserves

Dr Irvine says that *Sarcocolla* is supposed to heal wounds rapidly He gives the price at R1 4 a lb

§ This gum combined with bdellium is commonly used as a local application for rheumatism and neuralgic pains (*Surgeon F Robb Ahmedabad*)

Astragalus, sp

The roots of a species of *Astragalus* are in Tibet made into a strong paper (*Sir F D Hooker's Him Journ II 162*)

A tribuloides, Delille Fl Br Ind II 122

Vern—*Ogdā* Ps

Habitat—Grows in the western and central parts of the Panjāb plains Distributed through Afghānistan to Egypt

Botanic Diagnosis—Heads dense sessile leaflets 13 15 oblong lanceolate acute pod short linear oblong densely pubescent little recurved 10-12 seeded, ub bilocular

Medicine—The seeds are used medicinally

A. virus, Oliver

THE TRAGACANTH (See *Bassora Gum*)

Gum—Flückiger and Hanbury in the *Pharmacographia* describe 10 species of *Astragalus* as yielding the tragacanth of commerce, none of

A 1597

| The Atriplex | ATRIPLEX halimoides |
|---|------------------------------|
| which are met with in India. The above species is enumerated as one of the 10. (For further particulars see TRAGACANTH) | MEDICINE Gum 1598 |
| Medicine —The gum is officinal being emollient and demulcent use- ful in irritation of the mucous membranes but especially of the pul- monary and genito-urinary organs. Imported into India and sold by druggists. | |
| § <i>Tragacanth</i> or <i>Katilli katerá</i> is a valuable medicine in gonor- rhoea. Its emollient and demulcent properties suggest its use in all cases of irritation of mucous membranes. During the hot season it is given to horses for its demulcent and refrigerant qualities. (<i>Surgeon R. L. Dutt</i> <i>M. D. Pubna</i>) | |
| ATALANTIA , <i>Correa Gen Pl I 305</i> | 1599 |
| Atalantia missionis , <i>Oliv Fl Br Ind I 513</i> RUTACEÆ | |
| Syn — <i>LIMONIA MISSIONIS</i> Wall | |
| Vern — <i>Pamburu</i> SINGH | |
| Habitat —A small tree in the hotter parts of South India and Ceylon | |
| Structure of the Wood —Wood yellowish white sometimes variegated moderately hard close grained. Annual rings marked by a white line and a belt of more numerous pores. Weight 48 lbs per cubic foot. Used for furniture and cabinet work. | TIMBER 1600 |
| A. monophylla , <i>Corr Fl Br Ind I 511</i> | 1601 |
| THE WILD LIME | |
| Vern — <i>Mákad limbu mákad limbu</i> MAR <i>Narguni</i> URIYA <i>Adavi</i> <i>nimma</i> TEI <i>Kattu elumichcham-param kalyalu</i> (?) TAM <i>Kan</i> <i>nimbe adavi nimbe</i> KAN <i>Atavi jamb ra</i> SANS <i>Mal narauga</i> MAL <i>Jangli nimbu</i> DUK <i>Mutangnar</i> S KONKAN | |
| Habitat —A large shrub or small tree of East Bengal South India and Ceylon. | |
| Medicine — <i>Ainslie</i> says that the berries of this thorny plant yield a warm oil which is in native medicine considered as a valuable applica- tion in chronic rheumatism. | MEDICINE. Berries 1602 |
| Structure of the Wood —Wood yellow very hard and close grained Weight 65 lbs per cubic foot. Numerous white concentric lines at vary- ing distances. | TIMBER 1603 |
| The <i>Bombay Gazetteer</i> (Vol XV Pt I 62) says the wood of this plant is close grained and heavy but is not generally used. Recommended by <i>Kurz</i> as a substitute for box wood. | |
| Atis , The, see <i>Aconitum heterophyllum</i> , Wall RANUNCULACEÆ | |
| ATRIPLEX , <i>Linn Gen Pl III 53</i> | 1604 |
| A genus of CHENOPODIACEÆ with the foliage covered with a granular mealiness. The Oraches are chiefly distinguished by the two bracts or small leaves enclosing the fruit and enlarging after flowering. They are frequently dotted with large coloured warts which give them a peculiar appearance. The genus possesses several species, which are very variable in form according to soil and situation. (<i>Treasury of Botany</i>) | |
| The generic name is derived from a from and <i>τρέφω</i> to nourish. A genus of important fodder plants frequenting desert tracts near salt marshes and on the sea-coast. | |
| Atriplex halimoides , <i>Lindley</i> , Syn for A. Lindleyi , <i>Moq DC</i> <i>Prod XIII 2 100</i> | 1605 |
| ‘Over the greater part of the saline desert interior of Australia | A. 1605 |

**ATRIPLEX
nummularia****Australian Salt-bush.**

- reaching the south and west coasts A dwarf bush, with its frequent companion *A. holocarpum* among the very best for salt bush pasture (*Baron F von Mueller Select Extra Tropical Plants p 39*)
- 1606** *Atriplex hortensis*, *L*, and *A. laciniata*, *L* *DC Prod*, *XIII*, 2, 91, 93
GARDEN ORACHE, THE MOUNTAIN SPINACH, Eng ARROCHE Fr
(FOR GARDEN SPINACH see Spinacia oleracea.)
Vern — Korake suraka Pb
- FOOD**
1607 **Habitat**—These two species inhabit the Western Himálaya in the temperate zone also sub-montane tracts in the Panjáb and in Afghanistan
Food—The former is said to be a favourite vegetable on the Peshawar valley Is this the *malluach* or mallows of Job xxx 4? Who cut up (*malluach*) mallows by the bushes and juniper roots for their meat The garden orache is an erect growing hardy annual with large hastate leaves much cultivated in France for its large and succulent leaves which are used as a spinach It is however far inferior to the true spinach there are several varieties differing chiefly in the colour of the leaves and stems The seeds are said to be unwholesome exciting vomiting (*Lindley s Vegetable Kingdom*)
- 1608** *A. nummularia*, *Lindley DC Prod*, *XIII P II 460*
Habitat—From Queensland through the desert tracts to Victoria and South Australia
FODDER
1609 **Fodder**—One of the tallest and most fattening and wholesome of Australian pastoral salt bushes also highly recommendable for artificial rearing as the spontaneously growing plants by close occupation of the sheep and cattle runs have largely disappeared and as this useful bush even in many wide tracts of Australia does not exist Sheep and cattle depastured on salt bush country are said to remain free of fluke and get cured of this distoma disease and of other allied ailments (*Baron F von Mueller Select Extra Tropical Plants p 40*)
1610 The following account of the experiments connected with the efforts which are being made to introduce this most valuable plant into India will be found interesting —
The small plantation which was made last season continues to thrive The plants are now from four to six feet high They are remarkably healthy and nearly all of them are in flower
The genus *Atriplex* differs from that of *Chenopodium* in having the flowers unisexual and in some species of *Atriplex* the flowers are not only unisexual but dioecious i.e. some plants bear male flowers only and others only female ones The salt bush is described in the *Flora of Australia* Vol V p 170 as dioecious A few of the plants in this garden however are distinctly monœcious clusters of the broad fruiting bracts being rapidly developed beneath the terminal racemes of the withered male flowers This is so far favourable for supplying a more bountiful supply of seed for distribution from our own plants I have been daily expecting to receive a large supply from Australia
“Up to date 468 plants have been distributed and about 60 are left in stock
Inquiries have been made regarding the condition of plants despatched from this garden to different places in India Those sent to the Cawnpore Farm all died about two months after they were planted. Of the 50 plants sent to Mr Ridley at Lucknow only two survived these latter he tells me were planted out last November and are now healthy
- A. 1610**

Deadly Nightshade.

ATROPA
Belladonna.

plants about one foot high and with an equal spread Mr W Impey O S writing from Cawnpore in March last says The *Atriplex summlaria* (plants) of last year are thriving very well Some of the bushes are 3 to 4 feet high and I have taken many cuttings from them Fifty plants were sent to Bara Banki The President of the Local Committee informs me that they were planted in poor soil, where other trees or cultivation have hitherto failed A few have died and the remainder though they have made considerable growth are not thriving on the poorer soils as the plant was represented to be likely to do Mr Dowle the Settlement Officer at Kurnaul reports favourably on the plants sent to him on 31st December last

The salt bush being essentially a desert plant should not be permanently transplanted until after the rainy season is over this injunction applies more particularly to those parts of North West India where the rains continue for any length of time As soon as the plants have had sufficient time to establish themselves no amount of rain is likely to injure them If the seed is sown in pots during the hot weather the seedling will be ready for transplanting in September or October (*Report on Botanical Gardens Saharunpur and Mussoorie 1883 84 p 8*)

Atriplex spongiosum, F v Mueller

Through a great part of Central Australia extending to the west coast Available like the preceding and several other native species for salt bush culture Unquestionably some of the shrubby extra Australian species particularly those of the Siberian and Californian steppes could also be transferred advantageously to salt bush country elsewhere to increase its value particularly for sheep pasture (*Baron F von Mueller Select Extra Tropical Plants p 40*)

FODDER
1611**A. vesicarium, Heward**

In the interior of South Eastern Australia and also in Central Australia Perhaps the most fattening and most relished of all the dwarf pastoral salt bushes of Australia holding out in the utmost extremes of drought and not scorched even by sirocco-like blazes Its vast abundance over extensive salt bush plains of the Australian interior to the exclusion of almost every other bush except *A. halimoides*, indicates the facility with which this species disseminates itself (*Baron F von Mueller Select Extra Tropical Plants p 40*)

FODDER
1612**ATROPA, Linn Gen Pl, II, 900**

A genus of SOLANACEÆ containing only one species a native of the Western Himalaya from Simla to Kashmir altitude 6000 to 12000 feet and distributed to Europe and North Persia

A coarse lurid glabrous herb Leaves entire elliptic lanceolate Pedicels axillary solitary nodding Flowers somewhat large dirty purple or lurid yellow Calyx large deeply 5 lobed scarcely larger in fruit Corolla widely tubular campanulate lobes 5 triangular imbricate in bud stamens attached near the base of the corolla filaments linear anthers oblong dehiscing longitudinally Ovary 2 celled style linear stigma obscurely 2 lobed Berry globose Seeds many compressed embryo perispermic (*Fl Br Ind IV 241*)

The generic name *atropis* one of the three Fates—the goddess supposed to determine the life of man by spinning a thread the name being given to this plant in allusion to its poisonous property It is the Nightshade or Dwale of English writers

1613

Atropa Belladonna, Linn Fl Br Ind, IV, 241

DEADLY NIGHTSHADE

Vern.—*Sag angur angur shéfa* HIND ; *Suchi* PB *Girbush* BOMB

1614

A. 1614

ATROPA
Belladonna**Deadly Nightshade**

Ustrung ARAB *Merdum seeah* (?) PERS *Yebuy* BENG *Luckmuna luckmunee* HIND These names are of very doubtful correctness but are given on *Ainslie's* authority (*O Shaughnessy*)

§ *Girbuti* — I never heard this name nor have I seen the drug here ' (*Dr W Dymock*)

Habitat — Simla to Kashmír 6000 to 12000 feet found wild in Kanáwár at 8500 feet

Dr Aitchison writes me that the var *lutescens* *Jacq* is a much more common plant from Kanáwár to Afghánistan, having the same properties as the type form of the species

Botanic Diagnosis — The leaves of the Indian plant are a little more acuminate in the Himálayan than in the European plant This is probably what has given origin to *A. lutescens* *Jacq* **Matthioli** calls this plant *Solanum majus*, and tells us that the Venetian ladies used water distilled from the plant as a cosmetic hence the name *herba Bella donna*

MEDICINE
Leaves**1615****Root****1616**

Medicine — The official parts of this plant are its leaves and the dried root They are powerfully sedative anodyne and antispasmodic As an antispasmodic it is a valuable medicine in the advanced stages of whooping cough spasmodic asthma laryngismus stridulus chorea, epilepsy and spasmodic stricture of the urethra as a sedative and anodyne in various forms of neuralgia rheumatism tetanus hydrophobia delirium tremens dysmenorrhœa and other painful uterine affections cancerous and other painful ulcerations in cataract and other eye affections in which it is desirable to dilate the pupil or to keep the edge of the iris free it is invaluable in surgical practice In rheumatic and scrofulous iritis it is a relieving agent

The properties preparations and uses of this drug are too well known to require to be treated of here The reader is referred to the following works *Pharmacopœia of India* pp 171 174 *Flückiger and Hanbury's Pharmacographia* pp 455 to 459 *U S Dispensatory* 15th Ed 281 to 285 *Bentley and Trimen's Medicinal Plants* 193 *Royle's Mat Medica* Ed *Harley* pp 488 to 496 &c &c

It is a remarkable fact that while this most useful plant is exceedingly plentiful in many parts of the Western Himálaya its medicinal virtues seem to have escaped the detection of the natives of India completely Absolutely worthless drugs are carefully collected and exported to the plains of India from the very localities in which *Belladonna* is abundant and yet not a single leaf or root of this most valuable drug can be purchased of Indian origin in the native drug shops of the plains No mention is made of it by **Drs Dymock Moodeen Sheriff** nor by **U O Dutt** **O Shaughnessy** refers to it briefly and gives the paragraph which will be found under the vernacular names He says it is known in the bazars of Central Asia and the North of India **Ainslie** who gives the vernacular names republished by **O Shaughnessy** and **Birdwood** states clearly however that he has never seen the plant in India, and recommends its introduction

It would therefore appear that the natives of India have been made familiar with the virtues of this plant in the form of an imported drug while the Himálaya might supply the world with *Belladonna*.

Chemical Composition — § The active principle of *A. Belladonna* is atropia, an alkaloid which is either identical with or very closely allied to daturine. It exists in all parts of the plant apparently in combination with malic acid The quantity present in various parts of the herb has been determined by **Gunther** and others. The ripe seeds contain the largest percentage while the root and stalk contain a very much smaller amount Physiologically atropine acts on the pupils, and on the system

1617**A 1617**

| Gold | | AURUM |
|---|--|--------|
| <p>generally in the same manner as daturine. A second alkaloid <i>Bella</i> domin has been discovered as existing in the plant but according to <i>Blyth</i> it is probably a product of the decomposition of atropine. By the action of certain reagents atropine gives rise to various derivatives tropine atropic acid and isotropic acid. According to <i>Biltz</i> asparagine is contained in the <i>Belladonna</i> plant. (<i>Surgeon Warden Professor of Chemistry Calcutta</i>)</p> | | |
| <p>Special Opinions—§ Useful to diminish the secretion of milk it checks excessive and especially local perspiration as of the hands or feet or of the head and face in phthisis it also checks salivation from mercury or other cause. It is antagonistic to Calabar bean aconite and to the poisonous principle of fungi (muscarin). (<i>Surgeon Major E G Russell Calcutta</i>)</p> | | |
| <p>Useful in mercurial salivation. (<i>Surgeon H D Masani Karachi</i>)</p> | | |
| <p>I have found a drop of atropine occasionally dropped into the eye to give great relief in ocular neuralgia. I know of no better anodyne for external application in facial neuralgia than a combination of aconite and belladonna. I usually apply dry heat after their application to the painful part. (<i>Surgeon Joseph Parker M D Iona</i>)</p> | | |
| Attar of Roses, see <i>Rosa</i> | | |
| AUCUBA, Thunb Gen Pl I 950 | | 1619 |
| <p>A genus containing 3 species of small trees or only 3 forms of 1 belonging to the Natural Order CORNACEÆ. A glabrous branching shrub. Leaves opposite petioled ovate or lanceolate (obtusely serrate) leathery shining turning black on drying. Flower small decussate. Male calyx small 4 toothed. Stamens 4 disk quadrangular fleshy. Berry ellipsoid crowned by the calyx teeth and style smooth shining orange yellow or scarlet.</p> | | |
| <p>The generic name is of Japanese origin. The presence of this plant is one of the most striking temperate Japanese features of the Eastern Himalaya and Manipur as compared with the Western Himalaya.</p> | | |
| Aucuba himalaica, Hook f Ill Him Pl t 12 Fl Br Ind II 747 | | 1620 |
| <p>Vern—Phul amphi NEPAL Singna tapathyer LEPCHA</p> | | |
| <p>Habitat—A small tree of the Sikkim Himalaya Bhutan Naga Hills and Manipur between 5000 and 9000 feet.</p> | | |
| <p>Structure of the Wood—Wood black when fresh cut becoming lighter-coloured on exposure hard and close grained. Weight 55 lb per cubic foot.</p> | | |
| Auklandia Costus, Falc see Saussurea Lappa, C B C COMPOSITÆ | | |
| AURUM | | 1622 |
| Aurum GOLD | | |
| <p>Vern.—(The metal) Sóna HIND DUK BENG GUJ and MAR, Pau thangan TAM and MAL Bangaru TEL and KAN Zahab ARAB Suvarnam SANS Tar tila or tila PERS Ran SINGH Shue BURM (Gold leaf) Sonehru-varaq sone ku varaq HIND Sone-ká tagat DUK Sonar pat sonali BENG Tanga-reku pou réku TAM and MALA Bangaru reku TEL and KAN Sone-cha-varaq sona-nu-varaq GUJ; Suvarna-patram SANS Ran tahadu ran tagadu SINGH, Shue saka BURM</p> | | |
| <p>Medicine.—Is used in the form of leaf as a nervine tonic. Combined with silver leaf arsenic and other metals in the form of confection called <i>májun</i> or <i>maajun</i>, it is extensively employed by hakims.</p> | | |
| 2 A | | A 1623 |

AVENA

Auxiliaries to Dyes

The metal is first beaten into leaf free from any amalgam. It is then heated and rubbed with mercury some 13 or 14 times when it is said to lose its metallic character and becomes reduced to a reddish powder.

In this condition it is prescribed and it is considered a valuable tonic and alterative improving the memory and intellect. It is by the *kabirajes* prescribed in fever, consumption, insanity, impotence and other nervous diseases. Dose one to two grains. (*U C Dutt*)

Gold leaves are used by Mussulman beggars and other hemp smokers. The hemp *ganja* is laid on the bowl of the pipe, the gold leaf is stretched across the mouth of the bowl and on the leaf fire is placed. The foil is also sometimes plastered over sweetmeats. (*Bomb Gas Vol IV 128*)

§ It is also used as a stimulant. (*Assistant Surgeon Bhugwan Das Rawal Pindi*) Used to stop decayed teeth and as plates to artificial teeth, false palates &c. (*Brigade Surgeon G A Watson Allahabad*)

It is held in high repute for the treatment of consumption. The gold leaf is given with butter and sugar or it is used in various combinations. (*Surgeon Major J Robb Ahmedabad*)

1624

DYE AUXILIARIES

Auxiliaries used in dyeing, some of which cannot be viewed as mordants.

1625

1 **Lime** — This is used in calico-printing with gums as a resist paste. It is also used with sugar to promote the fermentation of indigo.

It is prepared from the following —

- (a) Limestone Rock such as that obtained from the Khasia Hills.
- (b) From *Lankar* the calcareous tuberculated masses found in beds on the surface or a little below the surface of the soil from Behar northward to the Panjab. In the North West Provinces this is used for metallising the roads.
- (c) By burning Land Shells collected in Bengal just after the rains.

1626

2 **Potash** — This is chiefly obtained from the ashes of certain plants.

The Common Millet is largely used for this purpose in the North West Provinces. *Symplocos* and other bushy plants in the hills of Bengal but in the plains of Bengal the ash of *Apang* (*Achyranthes aspera*, L.) is largely used for this purpose—see **Alkaline Ashes**.

1627

3 **Reh** an impure carbonate and sulphate of soda found as a natural efflorescence on the soil often rendering it uncultivable and burning up the vegetation. This is used chiefly like soap to wash fabrics before they are dyed. (See **Reh** and also **Barilla**.)

1628

4 **Rassi** — Carbonate of soda prepared from the preceding by precipitation of impurities.

1629

5 **Sajji** a mixture of carbonate of soda and potash or wood ash. This is used chiefly in extracting the deeper red colours from safflower. (See **Barilla** and **Sajji máti**.)

1630

6 **Saltpetre** is obtained like **Reh** as an efflorescence on the surface of the soil. It is chiefly used in wool dyeing.

See also **Iron Sulphate**, **Ochre**, and **Proto-sulphate of Iron**.

1631

AVENA, Linn, Gen Pl, III, 1160

A genus of grasses belonging to the Tribe **AVENÆ** of the Natural Order **GRAMINEÆ**. There are said to be some 40 species in the whole world confined to the temperate regions. Annual or herbaceous plants. *Spikelets* 2 many flowered very rarely 1 flowered. *Glumes* the inferior empty equalling or overtopping the flowers. Lower *pale* large-awned ending in 2 points, having lateral veins.

A. 1631

Meadow Oat Grass

AVENA
pratensis

Awn dorsal kneed and twisted **Stamens** 3 **Ovary** hairy at the top **styles** short distinct plumose **Fruit** crested or rarely glabrous furrowed oblong or elongate fusiform enclosed within the glume and pale the latter shortly adherent

The generic name is the classical Latin name *Avena* an Oat *Avoine* Fr *Avena* Sp *Avea* Port *Vini* It The genus was known to the Greeks under the name of *Bromus* but there is no evidence that Oats were cultivated either by the Romans or by the Greeks It seems probable that all the forms referred to this genus are but cultivated derivatives from a single prehistoric species a native in all probability of east temperate Europe and of Tartary They nowhere exist in a truly wild condition but accompany cultivation frequenting deserted fields roadsides or rubbish heaps in a manner exhibited by no other cereal

Avena fatua, Linn

1632

THE WILD OAT

Vern — *Kulud ganer gandul jai* HIND *Gobang ganerjer kasamm yupo upwa* PB

According to **Professor Buckman** in the *Treasury of Botany* this is most probably the plant from which by a continuous process of cultivation the domesticated oat has been induced He bases this opinion on a series of experiments from 1851 to 1860 in which he ultimately obtained a plant which could hardly be distinguished from the Tartarian or so-called potato oats He also points out that shed oats gone wild on a field degenerate the first indication of which being the production of hairs upon the grains similar to those in *A fatua*, a character which cereal oats never possess

Habitat — Inhabits the plains and hills of Northern India common as a field weed in cereal crops throughout the plains ascends the Himalaya up to 9500 and 11500 feet

Botanic Diagnosis — Panicle erect spikelets drooping each of about 3 flowers flower falling short of the glume with fulvous hairs at the base lower pale bifid at the end Plant about 3 feet in height root annual upper glume 50 veined and awn much bent the lower half twisted The awn is also long rigid and sensitive to the changes of the atmosphere as regards moisture These peculiarities give the seed so much the appearance of a fly that it has been used in trout fishing for this purpose On coming in contact with the water the long awns begin to twist about and deceive the fish by their apparent struggling This property has also given origin to their being used as a hygrometer the seeds jumping about when breathed upon or when the atmosphere becomes moist

Medicine — It is believed to produce poisonous and deleterious effects

Fodder — **Stewart and Madden** say that in all the places where it grows it is pulled up or gathered for fodder but is suspected of occasionally producing bad effects

MEDICINE
1633
FODDER
1634

A. pratensis, Linn

MEADOW OAT GRASS, NARROW LEAVED OAT GRASS

1635

Syn — *A BROMOIDES Kunth*

Habitat — Reported to occur in Lahoul In Europe this is described as a denizen of moors and poor clays its specific name being thus inappropriate, as it is seldom met with on meadows

Botanic Diagnosis — Panicle erect with simple or slightly divided branches flowers erect 3-6 exceeding the glumes the upper of which are only 3 veined Root fibrous height nearly 2 feet

A 1635

AVENA sativa.**Oats****FODDER**
1636

Fodder—Baron von Mueller says it thrives well on dry clayey soil producing a sweet fodder it is recommended for arid ground particularly such as contains some lime, being thus as valuable as *Festuca ovina*

1637**Avena pubescens, L**

DOWNY OAT GRASS

Syn—TRISETUM PUBESCENS R & S

Habitat—Royle found it at Simla In Europe this is a common meadow grass in limestone pastures

Botanic Diagnosis—Panicles erect nearly simple flowers erect 2 or 3 scarcely exceeding the glumes A creeping plant with the lower leaves and sheaths hairy height 1 2 feet

FODDER
1638

Fodder—It is a sweet nutritious prolific perennial grass requiring dry but good soil containing lime (Mueller) The downy hairs which cover the surface of the leaves of this grass when growing on poor soil almost entirely disappear when it is cultivated on a richer soil (Loudon Duthie)

1639**A sativa, Linn**

OATS

Vern—*Jai wilayat jan jani* HIND and PB

Under the subject of Oats DeOandolle (*L Orig Cult Pl* 299) says there is no Sanskrit name for Oats nor any in modern Indian languages Again (p 300) the European vernacular names prove an existence north west of the Alps and on the borders of Europe towards Tartary and the Caucasus The most widely diffused name is the Latin *Avena* Ancient Slav *ovisu ovesu oosa* Russian *ovesu* Lithuanian *awisa* Lettonian *ausas* Ostias *abis* The English word Oats comes according to A Pictet from the Anglo-Saxon *ata* or *ate* The Basque name *alba* or *oloa* argues a very ancient Iberian cultivation The Celtic names are quite different Irish *corce curce corca* Armorican *kerch* Tartar *sulu* Georgian *kari* Hungarian *sab* Croat *sob* Esthonian *kaer* are given by Memnich as generic names for oats

1640

Habitat—Of recent introduction into Indian agriculture it was first grown in Northern India under English auspices round cantonments and stud depôts for the supply of horses The oat is cultivated in temperate regions throughout the globe even as far north as the arctic zone

History—The origin of this plant is unknown but it is supposed by Dr Lindley to have been originally a native of Northern Europe This opinion is confirmed by DeOandolle in the passage quoted above Plants gone wild from cultivation show an approach to the type of *A strigosa* Schreb from which it is chiefly distinguished by the bristles at the end of the flowers These might be presumed to have disappeared under cultivation *A strigosa* may however only prove a variety of *A fatua* in which case the origin of the domesticated oats would have to be traced to that species See under *A fatua*

1641

Cultivation—The cultivation of oats has not gained much extension It is still confined to North India where it is restricted chiefly to districts where horse breeding is carried on *vis* in the Meerut and Rohilkhand divisions of the North West Provinces and in the Hissar and Karnal districts of the Panjáb In the Meerut Division the area annually under oats is 5 000 acres and in Rohilkhand 3 000 acres The total area under the crop in the 30 temporarily settled districts of the North West Provinces and Oudh, including of course the two divisions just mentioned is returned at 9,781 acres

A 1641

Oats.

AVENA
sativa.

Oats are grown as a rule on the better-class soils near village sites. The mode of cultivation differs in no way from that pursued with Barley in fact they are often sown together. Messrs Duthie and Fuller write

With a copious supply of water it has been found that oats are an invaluable green fodder crop for the cold season yielding as many as three cuttings and then making sufficient growth to bear a thin crop of grain. A large area under oats is most successfully treated in this way each year at the Hissar Government cattle farm. When grown in this manner they class rather as a green fodder than as a grain crop. When grown for grain the outturn is (in Northern India) 18 maunds on irrigated and 10 maunds on unirrigated land per acre. There seems very little hope of the trade of India being much extended.

The produce probably comes from the northern parts of the Panjáb and the North West Provinces.

TRADE RETURNS

The following are the Imports and Exports of Oats for the past five years ending 1883-84 —

Imports and Exports of Oats

| YEARS | Imports | | Exports | |
|---------|---------|-------|---------|----------|
| | Cwt | R | Cwt | Rs |
| 1879-80 | 48 | 47 | 84 095 | 3 47 574 |
| 1880-81 | 253 | 1 196 | 86 168 | 2 47 450 |
| 1881-82 | 738 | 5 130 | 75 967 | 1 91 791 |
| 1882-83 | 347 | 999 | 66 706 | 2 18 478 |
| 1883-84 | 537 | 4 174 | 87 25 | 2 91 909 |

The imports chiefly consist of oats brought by ships carrying horses.

The following table will show the quantity and value of the imports and exports of oat made in the year 1883-84 —

Detail of Imports and Exports in 1883-84

| Imports | | | Exports | | |
|----------------|-----|-------|-----------------|--------|----------|
| | Cwt | R | | Cwt | Rs |
| Imported from— | | | Exported to— | | |
| United Kingdom | 285 | 2 453 | Mauritius | 87 195 | 2 89 853 |
| Australia | 252 | 1 721 | Natal | 350 | 1 431 |
| | | | Other countries | 180 | 625 |
| TOTAL | 537 | 4 174 | TOTAL | 87 725 | 2 91 909 |
| Imported into— | | | Exported from— | | |
| Bengal | 51 | 3 5 | Bengal | 87 725 | 2 91 909 |
| Bombay | 354 | 2 451 | | | |
| Sind | 27 | 298 | | | |
| Madras | 105 | 1 050 | | | |
| TOTAL | 537 | 4 174 | TOTAL | 87 725 | 2 91 909 |

The above figures do not of course include the imports of oatmeal which are included under Provisions and Oilman's stores.

Varieties of Oats generally Cultivated.—The different kinds of oats are distinguished from each other by a variety of characteristics such as colour, size and form of the seeds, quality of the straw, the period of

**AVENA
sativa****Oats.**

ripening liability to shed their seeds in high winds and adaptation to particular soils and climates. There are three principal groups of oats easily distinguishable by colour *viz* white black, and gray or dun. White oats are separable into two principal varieties the late and early and these again into several sub varieties characterized by certain peculiarities of growth.

Early oats are best adapted for the higher class of soils as the greater yield per acre more than compensates for the inferiority of the straw. Their earliness renders them very suitable for late districts but the liability of some to shed their seeds in high winds renders their cultivation in high lying and exposed situations extremely hazardous.

Late or common oats as they are more generally termed in Scotland are distinguished from the early variety by late ripening thicker husk and less meal the latter being of better quality lighter per bushel not usually so prolific the former however have a more vigorous constitution and are better able to resist the effects of atmospheric changes such as rains or droughts and when ripe they are less liable to shed their seed in high winds the straw is greatly superior as fodder and lastly they can be cultivated with greater success than the earlier varieties on inferior soils and also those of a strong clayey nature.

Black oats are of two kinds—the one the Tartarian having the ear only on one side of the straw and the other the old or common black with black seeds but having a spreading ear similar to the white varieties. Dun oats are to all appearance hybrids between the last mentioned variety and one or other of the white sorts most probably the late or common white oat as they have more of the characteristics of the last mentioned such as hardness lateness adaptation to clayey and cold bottomed soils and by the superior quality of the meal and straw (*Morton's Cyclopædia of Agriculture Vol II p 482*).

Of foreign oats Great Britain imported in 1883 15 248 467 cwt and the annual imports show a steady increase.

The food value of oats is very great. The quantity of starch is nearest to that in barley. Oats are very rich in oil and fatty matter. The proportion of flesh forming materials in good oats is larger than in wheat barley or Indian corn. Many people in Scotland live entirely on oatmeal and their strong muscular forms are undeniable proofs of the superior qualities of oats in supplying the materials from which the muscles are formed (*Morton*).

Four varieties of Scotch oats free from husk and dried at 212 were analysed by **Professor Norton** and **Mr Fromberg**, with the following results —

| | 1 | 2 | 3 | 4 |
|-------------------------|--------|--------|--------|--------|
| Starch | 65 24 | 64 80 | 64 79 | 65 60 |
| Sugar | 4 51 | 1 58 | 2 09 | 0 80 |
| Gum | 2 10 | 2 41 | 2 12 | 2 28 |
| Oil | 5 44 | 6 97 | 6 41 | 7 38 |
| Casein (avenine) | 15 76 | 16 26 | 17 72 | 16 29 |
| Albumen | 0 46 | 1 29 | 1 76 | 2 17 |
| Gluten | 2 47 | 1 46 | 1 33 | 1 45 |
| Epidermis | 1 18 | 2 39 | 2 84 | 2 28 |
| Alkaline salts and loss | 2 84 | 1 84 | 0 94 | 1 75 |
| | 100 00 | 100 00 | 100 00 | 100 00 |

The Averrhoa.

AVERRHOA
Carambola.

M Boussingault in his *Economic Rurale* gives the following analysis of oats according to life-sustaining compounds —

| | |
|-----------------------------|--------------|
| Nitrogenous ingredients | 13 03 |
| Non nitrogenous ingredients | 82 07 |
| Inorganic ingredients | 4 00 |
| | <hr/> 100 00 |

And according to ultimate elements —

| | |
|----------|--------------|
| Carbon | 50 70 |
| Hydrogen | 6 40 |
| Oxygen | 36 70 |
| Nitrogen | 2 20 |
| Ash | 4 00 |
| | <hr/> 100 00 |

For warm climates oatmeal is not a proper article of human diet as it heats the blood and produces eruptions on the skin neither is it wholesome for persons engaged in sedentary employments.

The oat constitutes the most important article of food for horses in Great Britain.

Oat straw has been supposed to be less nutritious than other kinds of straw but it would appear this opinion is quite erroneous as regards the oat straw grown in Britain (*Morton's Cyclopædia: Article Oats Vol II pp 506 509 Atkinson Him Dist 692 Duthie and Fullers Field and Garden Crops Part I p 14*)

AVERRHOA, Linn Cen Pl, I 277

1643

A genus containing 3 species of small trees belonging to the Natural Order GERANIACEÆ Two are cultivated in most tropical countries and the third is indigenous to the New World whence the cultivated species were most probably introduced to India by the Portuguese

Averrhoa Bilimbi, Linn Fl Br Ind I, 439 Roxb, Fl Ind, Ed C B C 387

1644

BILIMBI TREE

Vern — *Bilimbi* (the fruit) *belambu* HIND *Bilimbi blimbi* BENG *Belambu* DUK *Blimbu* GUJ *Bilambi* MAR *Iulich chakk v bilimbi* KAY *koch chit tamaritai* TAM *Pulusu k ya lu bili bili kyalu* TEL *Vilunikkā vilimbi karichakka* MAL *Kula soun si kala soun-ya-si* BURM

Habitat — Cultivated in gardens on the plains of India. It flowers in the beginning of summer and ripens its fruit in about two or three months after. The fruit is cylindrical about two inches long and pulpy, and is very sour when green but loses some of its acidity when ripe. It has become almost naturalized in India.

Food — The fruit is generally used in pickle and in curry. The flowers are made into preserves.

FOOD
1645

A. Carambola, Linn Fl Br Ind, I 439 Roxb Fl Ind, Ed C B C 387

1646

Vern — *Karmal khamrak kamaranga* HIND *Kāmrāngā kamarak* BENG *Kardai* ASS *Tamarak kamarakha* GUJ *Kamarakha* MAR *Khamaraka karamara* BOMB *Khamrak* DUK *Tamarta tamaritam* KAY TAM *Karomonga tamarta-kāya*, TEL *Tamarat tūka* MALA

A 1646

**AVICENNIA
officinalis****The White Mangrove**

Kamarak KAN Karmaranga SANS Zoun si noun ya si saunggya
BURM

Habitat—A small tree with sensitive leaflets 15 to 20 feet in height extensively cultivated in India for its apples which when stewed are very palatable. It is found as far north as Lahore.

Dye—§ The unripe apples are astringent and are used as an acid in dyeing. The acid probably acts as a mordant. (*Deputy Surgeon General G Bidie Madras*)

Medicine—The leaves the root and the fruit are used as cooling medicine. (*Amsterd Cat*) The acid dried fruit is given in fevers. (*Irvine Mat Med Patna p 55*)

§ Kamranga is met with in two forms in Bengal—the sweetish acid and the extremely sour. The former is cooling and useful in feverishness. Both varieties have antiscorbutic properties. (*Surgeon R L Dutt M D Pubna*) The fruit is an excellent antiscorbutic. (*Surgeon Major J E I Atchison Simla*) It is highly cooling if taken raw it brings on fever and chest complaints. (*Assistant Surgeon J N Dey Feypore*)

The ripe fruit has a pleasant acid and sweetish taste and is used for culinary purposes. (*Surgeon Shib Chunder Bhattacharya Central Provinces*) Fruit used for making pickles. (*Deputy Surgeon General G Bidie C I E Madras*) Fruit used in curries. (*Honorary Surgeon P Kinsley Chicacole Ganjam Madras*)

Food—It blossoms in the rainy season and the fruit which ripens in December and January is about three inches long and is eaten raw to a small extent by the natives. The flesh is soft juicy and refreshing. It is sometimes stewed in syrup with a little cinnamon and is then very pleasant. It is also made into an agreeable jelly.

Structure of the Wood—Light red hard close grained. Weight about 40 lbs.

Mr Home of the Forest Department says it is used in the Sunderbans for building purposes and for furniture.

AVICENNIA, Linn Gen Pl II 1160

A genus of VERBENACEÆ comprising in all some 3 or 4 species of bushes or small trees frequenting the salt marshes on the coast and in the tidal forests of rivers of India Burma the Andaman Islands Africa Australia New Zealand Tasmania America and the West Indies.

Branchlets fleshy. *Leaves* opposite in the Indian plant coriaceous elliptic lanceolate. *Flowers* yellow sessile in rounded heads. *Calyx* of 5 sepals supported by ovate ciliate bracts. *Corolla tube* short limb of 4 nearly equal segments. *Capsule* compressed ovate mucronate 2 valved 1 seeded radicle woolly cotyledons thick fleshy folded. Like the true mangrove the seeds frequently germinate within the fruits while attached to the tree.

The genus is named in honour of *Avicenna* an Arab physician philosopher mathematician &c who lived (at Bokhara?) between the years 980 and 1037.

Avicennia officinalis, Linn**THE WHITE MANGROVE**

Syn—A TOMENTOSA Jacq

Vern—*Bina* (bars in Gamble) BENG *Mada nalla-mada* TEL, *Twar* BOMB MAR SIND *Oepata* MAL *Lamed thame* BURM

Habitat—A small tree or shrub of the salt marshes and the tidal forests of India and Burma found also in Andaman Islands. **Roxburgh** says it is common near the mouths of rivers where the spring tides rise. It is found everywhere in the Sunderbans often becoming a tree of considerable size but on the Coromandel coast it is only a bush. **Kurz**

A 1655

DYE
1647
MEDICINE
1648
Leaves
1649
Root
1650
Fruit.
1651

FOOD
1652

TIMBER
1653

1654

1655

The Azima

AZIMA
tetracantha

gives this species as frequent along the Burmese coast from Chitagong along with the next species

Botanic Diagnosis — *Leaves* usually lanceolate and indistinctly white tomentose beneath *flowers* shortly spiked *calyx lobes* 1 line long *style* very short (*Kurz*)

Dye — The bark is used as a tanning agent (*Birdwood Bombay Prod*) The ashes of the wood are used to wash cloth (*Drury*) In Rio Janeiro the barks of various species of *Avicennia* are used in tanning leather

Food — The kernels are bitter but edible

Structure of the Wood — Grey with a darker heartwood hard heavy consisting of numerous narrow well marked concentric layers Weight 58 lbs per cubic foot

It is very brittle used in India only for firewood **Major Ford** says it is used for mills for husking paddy rice pounders and oil mills in the Andamans

Avicennia tomentosa, *Roxb Kurz For Fl Burm II 276*
Aoxb Fl Ind Ed C B C 487

Vern — *Bin* HIND BENG *Timmer cheria* SIND *Twar* MAR
Nalla mada mada chettu TEL *Upputti* MAL

Habitat — Common in India in low places near the mouths of rivers and in salt marshes In the lower parts of the Delta of the Ganges it grows to a tree of considerable magnitude Frequent in the tidal forests all along the coast of Burma from Chittagong down to Tenasserim (*Kurz*) It is abundant on Bombay and Malabar coasts

Botanic Diagnosis — *Leaves* more or less obovate and usually indistinctly tawny tomentose beneath *flowers* in heads *calyx lobes* 2 lines long *style* long and slender (*Kurz*) It seems doubtful how far this should be viewed as distinct from the preceding species but if distinct the vernacular names and facts regarding the economic uses of the two plants would appear to have got completely mixed up together

Medicine — The roots possess aphrodisiac properties The unripe seeds are used as poultice to hasten suppuration of boils and abscesses

§ *Dhobies* in the Madras Presidency use the ashes of the wood for washing and cleaning cotton cloths It is also used in small pox The bark is used in Rio Janeiro for tanning (*Surgeon H W Hill Manbhum*) The bark is astringent (*Surgeon Major W Dymock Bombay*) Bark astringent ashes used for washing and bleaching cloth common in Madras (*Deputy Surgeon General G Bidie Madras*)

Azadirachta, see *Melia*

AZIMA, *Lam Gen Pl II 681*

Azima tetracantha, *Lam Fl Br Ind, III 620 SALVADORACÆ*

Syn — *MONETIA BARLERIOIDES* *L Herit Roxb Fl Ind Ed C B C 716* *FAGONIA MONTANA* *Miq*

Vern — *Kántagur kamas* HIND *Trikanta gati* BENG *Sukhá-pát* DUK *Sung-elley* or *sung-ilai changan-chedi muttu-chengan-chedi nallo-chengan-chedi* TAM *Tella-uppi uppi aku* TEL *Kundali* SANS

Habitat — A small thorny shrub growing plentifully in the Deccan and Ceylon On every part of the Coromandel coast it grows freely in all situations and is in flower and fruit most part of the year (*Roxb Fl Ind Ed C B C 716*) Frequent in the dry forests and shrubberies of Ava and Prome' (*Kurz, II 161*)

DYE
Bark
1656
Ashes
1657
TAN
1658
FOOD
Kernels
1650
TIMBER
1660

MEDICINE
Root
1661
Seeds
1662
Ashes as Soap
1663
TAN
Bark
1664

1665

A 1665

**ACCHARIS
indica.****The Baccharis**

FOOD
Berries
1666
MEDICINE
Juice
1667
Leaves
1668
Bark
1669
Decoction
1670

Food—The berries are white and are eaten
Medicine—The juice of the leaves is reported to relieve the cough of phthisis and asthma
The bark is also used as an expectorant
§ A decoction of bark is given as an antiperiodic in ague with success It is an astringent and tonic The leaves are used for ulcers and especially after small pox they are ground with turmeric and gingelly oil and then applied on the surface of the body removing the irritation of skin (*Surgeon Major Lionel Beech Cocanada*) The root bark is used in muscular rheumatism (*Native Surgeon Ruthnam Moodelliar Chingleput Madras*)

BACCAUREA, Lour Gen Pl III 283

1 **Baccaurea affinis, Mull Arg EUPHORBACEÆ**

2 **B flaccida, Mull Arg**

A small tree chiefly met with in South India

3 **B parviflora, Mull Arg**

Vern—*Kanaso* BURM (*Kura*)

4 **B sapida, Mull Arg Gamble Man Tim 354**

Syn—*PIERARDIA SAPIDA Roxb Fl Ind Ed C B C 323*

Vern—*Lutco* HIND *Latku* BENG *Kala bogoti* NEPAL *Sumbling* LEPCHA *Latecku* ASS *Koli kuki* KAN *Kanasu* MAGH *Kanaso* BURM *Lutqua* CHINESE

Habitat—A small or moderate sized evergreen tree met with in East ern Bengal Tippera Burma and the Andaman Islands

Dye—The leaves are used in Northern Bengal and Assam for dye ing (*Gamble*) The bark is used chiefly as a mordant in dyeing with madder and lac The Lepchas extract a green dye from the *leaves* (*Dr Schlich*) Regarding this statement it is extremely doubtful whether any single plant yields a green dye careful enquiry should be made to ascertain if the leaves are macerated along with the Lepcha indigo plant (*Marsdenia tinctoria*) to produce the green colour alluded to by **Dr Schlich** For information regarding other reputed simple green dyes see **Hedyotis, Jatropha, and Vigna**

Food—It produces a fruit of the size of a large gooseberry yellow and smooth with seeds embedded in a pulpy aril It is acid and pleasant and esteemed by natives In the Rangoon market it is generally plentiful **Roxburgh** says that the Chinese gardeners in his employment knew the tree and that in their country the fruit was called *lutqua*

Structure of the Wood—Greyish brown soft liable to split badly Weight about 42 lbs per cubic foot

BACCHARIS, Linn Gen Pl II, 286

An American genus of herbs shrubs or trees belonging to the COMPOSITÆ and containing some 200 species They are chiefly distinguished by the fact that the male flowers are on one plant and the female on another The resinous species are largely used as firewood An infusion of the seeds of one species is employed by the Brazilians as a sudorific and tonic while another species yields a bitter principle used in the treatment of fevers

10 **Baccharis indica, Linn, Syn for Pluchea indica, Less Fl Br Ind III, 272**

B 10

DYE
Mordant.
5
Green dye
6

FOOD
Fruit.
7

TIMBER
8

9

Oil, Medicine, Fodder, Timber

**BALANITES
Roxburghii.**

Baccharis nitida, Wall Syn for *Blumea chinensis* DC Fl Br Ind III 268

II

BALANITES, Delile Gen Pl, I 314

12

A small genus containing 2 or only 1 species belonging to the Natural Order SIMARUBACE. Spiny shrubs or trees. Leaves coriaceous 2 foliolate, entire. Flowers in axillary cymes small green. Sepals and petals 5, disk thick conical. Ovary entire 5 celled. Seeds solitary pendulous from the apex of each cell.

Balanites Roxburghii, Planch Fl Br Ind, I 521, SIMARUBACE

13

Syn — (?) Only a variety of *B. ÆGYPTIACA* met with in Africa. *XIMENIA ÆGYPTIACA* Roxb Fl Ind Ed C B C 323

Vern.—*Hingan hingu* or *hingen ingua* hingol hingota or hingot HIND *Hingon* BENG *Garrah* GOND *Hingana* or *hingan* MAR *Egora* or *oreo* *hinger* GUJ *Hinganbet* *hingan* DUK *Hinganbet* CUTCH *Hinjat* ULWAR *Hinganbet* BOMB *Nanjundá* TAM *Nan chuntu* MAIA *Gári gara-pandu gara chettu* (plant) ringri TEL *Ingudi-wrikshaka* (plant) *ingudi* or *ingudam* SANS

Habitat—A small thorny tree growing in the drier parts of India extending from Cawnpore to Sikkim Behar Gujarat Khándesh and the Deccan. It is found in Dehra Dun (Royle), and also in Burma.

Grows everywhere often little more than a thorny bush in the Panch Mahals Gujarat (Bomb Gaz III 200)

Properties and Uses—

Oil—A fixed oil is expressed from the seed. The corresponding oil prepared from the African plant is known to the negroes as *Zachun*.

§ The oil is used as an application for the cure of oclie. It is referred to in the drama of *Shakuntala* (*Sakharam Arjun Ravat L M Girgaum Bombay*)

Medicine—The SEEDS FRUIT BARK and LEAVES are used in native medicine. The seeds are given in coughs. The bark unripe fruit and leaves have anthelmintic properties attributed to them and are purgative. The bark is given to cattle as an anthelmintic especially by the people of Western India. The unripe drupes have strong cathartic properties they are also anthelmintic.

§ Seeds are expectorant dose 2 to 30 grains. Fruit purgative, 1 to 20 grains. (*Surgeon W Barren Bhuj Cutch*)

Seeds are useful in colic dose half a seed. (*Joseph Parker M D Poona*)

Fodder—The young twigs and the leaves are browsed by cattle.

The ripe fruit is oval of a yellowish colour composed of a sweet but disagreeable pulp surrounding the stone. In Western India as also in Egypt it is eaten as a fruit and when fermented is said to yield an intoxicating liquor used by the negroes. *Ballon* gives the ripe fruit the name of Desert date and when unripe that of Egyptian myrobalan.

Structure of the Wood—Yellowish white moderately hard no heart wood no annual rings. Weight 48 lbs per cubic foot.

It is used for walking sticks and for fuel and by the Africans for house furniture.

Domestic Uses—The nut is employed in fireworks. A small hole is drilled in it at which the kernel is extracted and being filled with powder and fired bursts with a very loud report so exceedingly hard is the nut (*Roxburgh*). The nuts are made into crackers in the Panch Mahals. The pulp of the fruit is used as a detergent to clean silk in Rajputana (*Brandis*). The bark yields a juice, used in the Panch Mahals, Bombay, to poison fish. (*Bomb Gaz III 200*)

OIL.

14

MEDICINE.

Seed.

15

Fruit.

16

Bark

17

Leaves

18

FODDER

Leaves and

Twigs.

19

TIMBER

20

DOMESTIC
Crackers

21

Soap Substi-
tute

22

Fish poison

23

BALIOSPERMUM
montanum**The Gajpīpal Medicine**

24

BALANOPHORA, *Forst Gen Pl III 235*

A genus of leafless parasites which give their name to a small Natural Order which may be briefly defined as parasitic herbs fleshy aphyllous monocious or dioecious having scapes naked or scaly and terminating in capitula of flowers each having 2 8 generally 3 lobed perianth with 3 many stamens inserted on the perianth the ovary being inferior and 1 celled In India we have only a few species belonging to this Natural Order Balanophora itself containing the most important examples The Indian species do not appear however to have been put to any economic use In Dr Dymock's *Mat Med West India* under *Gajpīpal* p 719 occurs a brief notice of what in all probability is a species of Balanophora It is sold in Bombay under the vernacular name of *gajpīpal* and is described as mucilaginous and astringent Various other plants are also sold by Indian druggists as *gajpīpal* Roxburgh gives *Pothos officinalis* as the drug which bears that name and in the Panjab it appears that *Plantago amplexicaulis* is also known to the native druggists as *gajpīpal*

Gajpīpal
25

In various parts of the world the species of Balanophoreæ are known to possess astringent properties The reddish juice of *Cupomorium coccineum* (the Fungus *Melitensis*) was formerly prescribed as an infallible styptic for hæmorrhage and diarrhœa In Java wax prepared from a species of Balanophora is made into candles

§ *Balanophora*? This is substituted in the shops of Bombay for *Scindapsus officinalis* It is a parasite Does not seem to possess any active properties (*Sakharam Arjun Ravat L M Gungauw Bombay*)

BALATA.ALATA GUM
26

Balata gum A caoutchouc like substance obtained in all probability from two or three species chiefly *Achras Sapota* Linn and several species of *Mimusops*, which see

27

BALIOSPERMUM, *Blume Gen Pl III 324*

A genus of EUPHORBIACEÆ comprising some four species of Indian shrubs or bushes belonging to the Tribe CROTONÆ and the sub tribe GELONIEÆ

Leaves alternate irregularly sinuato dentate or sub lobed penninerved or at times tri-costate at the base *Inflorescence* axillary racemes flowers fascicled, rarely elongated and lax *Flowers* monocious apetalous *Sepals* 4 5 imbricate *Stamens* 10-60 filaments thin free anthers terminal loculi adnate *Disk* entire *Ovary* 3 4 locular *style* short fleshy recurved shortly 2 fid *ovules* solitary in the loculi *Capsule* 3 celled separating into 3 cocci

28

Baliospermum montanum, *Mull Arg Gamble Man Tim, 348***EUPHORBIACEÆ**

Syn—CROTON POLYANDRUM Roxb *Fl Ind Ed C B C 687* C Rox BURGHI Wall

Vern.—*Danti hakum* or *hakun* BENG HIND *Dānti SANS* *Habbussala tīne sahrāi habbussaldīne-barri* ARAB *Bédanjīre khatai*, PERS *Konda amudam nappawlum* (Dr Kinsley) *adavi amudam* TEL *Po guntig* LEPCHA *Yangli-jamalgotā* N W P *Danti MAR* *Jam dgotā dāntimul* BOMB, GUJ CUTCH The vernacular names of *B montanum* *Croton Tiglium* *Fatropia glandulifera* and *F Curcas* are confounded with each other in most districts of India particularly in the Madras Presidency (*Moodeen Sheriff*)

The root is sold as *dantimul* by native druggists.

Habitat.—One of the commonest shrubs of North and East Bengal It extends to South India and Burma

Properties and Uses.—

Medicine.—The SEEDS are used as a drastic purgative but in over doses are an acro-narcotic poison they are sometimes used as a substi

MEDICINE
Seeds
29

B 29

The Balsamodendron

BALSAMODENDRON

tute for **Croton Tiglium**, and **Dr Dymock** tells me they are often sold in the bazars under the vernacular names given for that plant (*Famalgota*). They are also used externally as a stimulant and rubefacient. The **OIL** expressed from the seeds is a powerful hydragogue cathartic and is useful for external application in rheumatism. **Madden** states that to the east of the Sutlej its leaves are in high repute for wounds. The sap is believed to corrode iron. The **ROOT** is considered cathartic and is used in dropsy, anasarca and jaundice. It is generally administered with aromatics. (For the preparation of *Danti haritaki* confections see *U C Dutt's Mat Med Hindus* p 230.)

§ A decoction of the **LEAVES** is said to be useful in asthma. (*Assistant Surgeon Bhagwan Dass Rawal Pindi Panjab*)

Drastic purgative dose of powder 1 to 10 grains of the oil 1 to 3 minims used in dropsy. (*Surgeon W Birren Bhuji Cutch*)

The root *Dantimul* is much used in Hindu medicine. (*Surgeon Major W Dymock Bombay*)

OIL
30

MEDICINE
Root
31

Leaves
32

BALLOTA, *Linn Gen Pl II 1212*

Ballota limbata, *Benih DC Prod XII 521 LABIATÆ*

Vern — *Bui phutkanda jandi lana kandiari agshan awani buti* Pb

Habitat — A small prickly shrub with yellow flowers occurring on the Salt range Trans Indus and in the Jhelam basin at times ascending to altitude 4000 feet.

Medicine — The **JUICE** of the leaves is applied to children's gums and to ophthalmia in man and beast. (*Stewart*)

Fodder — Browsed by goats

MEDICINE
Juice
34
FODDER
35

BALSAM

Balsam, Canada, is obtained chiefly from **Pinus balsamea**, *L* see under **Abies**

Balsam, Copaiba, is obtained from several species of **Copaifera**, natives of South America

Balsam, Gurjan, see **Dipterocarpus**

Balsam of Peru is obtained from **Myroxylon Pereiræ**, *Kotz* a native of Central America

Balsam of Tolu is obtained from **Myroxylon Toluifera**, *H B K* a native of Central and South America

36

37

38

BALSAMODENDRON, *Kunth Gen Pl I 323*

39

A genus of **BURSERACEÆ** comprising some 10 species of balsamiferous spiny small trees or shrubs inhabitants of North India and Arabia and of tropical and South Africa.

Leaves alternate 15 foliolate or imparipinnate **leaflets** sessile oblique crenate serrate **Flowers** small few fasciculate polygamous on racemose panicles **Calyx** tubulo-urceolate 4 toothed persistent **Petals** valvate **Disk** erect cupular **Stamens** 6-8 usually 4 long and 4 short inserted on the margin of the disk **Ovary** sessile surrounded by the disk and 4-celled **style** short **stigma** obtuse 4 lobed **ovules** 2 in each cell **Drupe** indehiscent ovoid containing a 1 3-celled and -seeded stone or 1 3 distinct stones within the pericarp

Baillon claims that by priority the correct name for this genus should be **Balsamea** **Gleditsch Engler** (*Engler Bot Fahr I p 42*) in his revision of the **Burseraceæ** concurs in this view. In a work on Indian

**BALSAMODENDRON
Mukul****Gum Gugul**

Economic Botany it seems desirable however to follow the *Flora of British India* in all matters of synonymy

Balsamodendron Berryi, Arnott Fl Br Ind, I 129 BURSERACEÆ

GUM
40

Habitat—A tree of the forests on the east side of the Nilgiris

Gum—It is very fragrant and yields a gum resin

41

B Kataf, Kth**AFRICAN BDELLIUM**

Syn—BALSAMEA IEPYTHRÆA Engler AMYRIS KATAF Forsk HEMPRI

CHIA ERYTHRÆA Ehrenburg

Vern—Bysabol BOMB Muhishabole CUTCH Mhaisabol (or bésabol)

SANS Habak Hadí (corrupted into Habaghadi) ARAB

BDELLIUM
42

Gum—This gum resin reaches Bombay from Berbera the purer kinds very much resembling Myrrh with which it has been confused by many authors Professor Oliver refers it to **B Playfairii** thus making the gum resin *hodthai* to be obtained from the same plant as *bysabol* (see **B Playfairii**) *Bysabol* is darker and more reddish than the true Myrrh it is but sparingly soluble in bisulphide of carbon and the solution does not assume the violet shade characteristic of Myrrh on the addition of bromine It has a much stronger or acrid taste and a peculiar odour quite different from that of the true Myrrh (*Kew Report 1880 p 50 Fluck and Hanb Pharmacog p 146 Bentley and Trimen Med Plants p 60 Dymock's Materia Medica of Western India p 128*)

§ Emmenagogue Invariably given after delivery dose 1 to 6 grains used locally for chronic ulcers' (*Surgeon W Barren Bhuj Cutch*)

43

B Mukul, Hook Fl Br Ind I, 529**GUM GUGUL**

Vern—Guggul gugal mukul ranghan turb BENG HIND DUK GUJ and SIND (Gogul HIND) Gugal GUJ CUTCH Guggala KAN MAR Maishakshi (commonly maishuchi) gukkal gukkulu TAM Mahi saksh or maisakshi (commonly maisuchi) gugul TEL Moql mogle arsaqi aflitan ARAB Boi jahud n PERS Koushikaha guggulu SANS Gugula jatayu or javayu ratadummula SINGH

Habitat—A small tree found growing in the arid zones Sind Kattia war Rajputana Khandesh

GUM RESIN
44

Gum resin—Yields the gum resin known as *Gugul* or as an *Indian Bdelium* It occurs in vermicular or stalactitic pieces is of a brown or dull green colour and has a bitter acid taste It exudes from incisions on the bark made in the cold season It swells when heated diffusing a disagreeable odour

Properties and Uses—

MEDICINE
45

Medicine—Indian Bdelium is used in native medicine as a demulcent aperient carminative and alterative especially useful in leprosy rheumatism and syphilitic disorders It is also prescribed in nervous diseases scrofulous affections urinary disorders and skin diseases and is employed in the preparation of an ointment used for bad ulcers

It is known by the name of *gugul* or *mukul* and is said to be moister and therefore not so brittle as myrrh for which it is often used as a substitute being much cheaper The *Pharm India* states that in general practice it is found useful in the form of an ointment in cleansing and stimulating indolent ulcers and is a favourite in the treatment of Delhi sores especially when combined with sulphur catechu and borax *Gugul* has stimulating properties and is sometimes given internally, especially in the treatment of horses

Myrrh

BALSAMODENDRON
Myrrha

SPECIAL OPINIONS—§ Applied as a hot paste to incipient abscesses as an absorbent Is used as an expectorant Is aphrodisiac according to **Sk Boali Saina** the king of Hakims Applied locally as a paste in hæmorrhoids (*Surgeon G A Emerson Calcutta*) 'Used externally and internally in muscular rheumatism leprosy piles dysentery gleet scurvy fistula hysteria anæmia dyspepsia and chronic diseases of the lungs A preparation of *gugul* called *yogaraja gugul* is given internally for muscular rheumatism and is said to be more effective in its action when administered with the decoction of *rasna* given with the infusion of *adulsa* as an expectorant There are 22 ingredients in the preparation called *yogaraja gugul* (*Surgeon W Barren Bhuj Cutch*) Bdelium is sold in the native drug shops in Madras and is known as *Mahu sakshi* I have personally identified it" (*Deputy Surgeon General G Bidie C I E Madras*) The fumes of *gugul* are believed to be disinfectant (*Surgeon R L Dutt M D Pubna*) It is held in the highest repute in the treatment of rheumatism It is given internally and applied locally Internally it is given in the form of pill with numerous other native drugs (*Surgeon Major F Robb Ahmedabad*) Repeatedly beaten with a hammer its efficacy is said to increase it is extensively used here in sciatica and all rheumatic affections (*Surgeon F C Penny M D Amritsur*) In combination with other medicines (black pepper and colchicum) the gum is given in the form of confection in cases of rheumatism hæmorrhoids and flatulent dyspepsia The dose is 1½ drachms (*Lal Mahomed Hospital Assistant Hoshangabad Central Provinces*)

Structure of the Wood—Soft white Weight 20 lbs per cubic foot

Apparently not put to any purpose

Domestic Uses—Mixed with mortar the gum forms an excellent cement it is soluble in potash

Balsamodendron Myrrha, Nees

MYRRH

Vern—Bôl PERS HIND DUK *Gandha rasaha hirabôl bôl* BENG
Hirabol bôl GUJ CUTCH *Bôla gandha rasaha rasagandhaha* SANS
Mur or murr ARAB Mor HEBREW *Vellap pôlam* TAM *Bâlim*
tra-pôlam TEL *Bola* KAN *Bôlam gandarassa* SINGH

There are two important kinds of what may be called the true Myrrh these are the African or *Karam* and the Arabian and Siam or *Meetiya*

Habitat—A small tree of Arabia and of the African coast of the Red Sea Often cultivated in Western India

History—There are several distinct substances which in English go by the name of Myrrh There is the common British herbaceous plant belonging to the family of the Carrot (*UMBELLIFERÆ*) which in all probability derives its name *Myrrhis odorata*, from the resemblance of the smell of its fresh green stems to that of the Eastern Myrrh gums The Myrrh of the ancients is now pretty generally believed to have been the gum resin known in India as *Heerabole* or *Myrrh* a proportion at least of which is the produce of **Balsamodendron Myrrha, Nees** Bdelium and *gum gugul* are sometimes known as False Myrrh Some authors think that the Myrrh of the ancients was also obtained from a species of the genus *Cistus* the Rock Rose a genus not represented in India This idea is chiefly based upon the fact that the gum obtained from that plant is known at the present day by the name of *Ladanum* a word supposed to be the same as the Hebrew *Lât* which has been translated as Myrrh If this be correct two distinct gum resins have come to bear the same name in translations from the Hebrew writers

TIMBER
46
DOMESTIC
Cement
47
48

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BALSAMODENDRON**Myrrha****Myrrh**

THE
GUM RESIN
Myrrh
50

COMMERCIAL FORMS—Of the Myrrh of commerce there are two or three distinct varieties and under each an assortment of stuffs of different commercial value. There is the east coast African Myrrh known in Bombay as *Karam* and the South Arabian and Siam Myrrh the *Meetiya*. Myrrh of good quality is also sent from Persia. The latter two forms are really only substitutes however for Myrrh. The *Karam* obtained from Africa may be said to be the true commercial Myrrh but it is by no means proved that this is entirely obtained from **B Myrrha Nees**. The principal mart for Myrrh is in Bombay the chief firms having their agents at Aden and Mukulla. These agents attend the great annual fair at Berbera and exchange English and Indian goods for Myrrh and Bdellium. The bags of these on arrival at Bombay are said to contain 1st a large proportion of roundish masses of fine Myrrh 2nd a considerable proportion of small semi-transparent pieces of Myrrh 3rd numerous pieces of dark coloured Myrrh mixed with refuse 4th a small proportion of opaque gum resin (*Guibourts Opaque Bdellium*). The packages are assorted the best qualities are re-shipped for Europe as also the darker pieces declared as second quality while the refuse is exported to China. The best qualities of *Karam* Myrrh sell for ₹34 per maund of 37 lbs *Meetiya* ₹16 to 25 and the so-called refuse ₹8 per maund (*Dymock's Materia Medica W Ind pp 124 131*).

Myrrh is chiefly adulterated with inferior qualities or with the gums and resins derived from other species of **Balsamodendron**, such as **B Mukul**, **Hook B pubescens**, **Stocks B Opobalsamum**, and sometimes also with **B Roxburghii**, *Arn*.

Properties and Uses—

Medicinal Properties—Myrrh is beneficial in dyspepsia amenorrhœa and chlorosis and is a useful stimulant and astringent to all ulcerations or congestions of the mucous membrane. It is a useful application to old foul and indolent ulcers and a valued wash for the mouth and gums and a gargle in ulcerated sore throat (*K L De C I E Rai Bahadur*). It is a stimulant expectorant much admired as a remedy for pulmonary affections especially the asthma of the aged (*Ind Pharm*). **Meer Mahomed Husain** says it is hot and dry and that the best quality when broken shows white marks like those at the root of the finger nails. Internally it is regarded as tonic and antispasmodic emmenagogue astringent and expectorant. Hakims use it for intestinal worms. It is detergent siccative astringent and aperient a disperser of cold tumours and one of the most important of medicines as it preserves the humours from corruption. Dissolved in women's or asses' milk it is dropped into the eye in purulent ophthalmia (*Dymock*). It is said to cause abortion and is useful in fever and epilepsy.

OFFICIAL PREPARATIONS—It is an ingredient in Decoctum Aloes Comp in Mistura Ferri Comp in Pilula Aloes et Myrrhæ in Pilula Asafœtidæ Comp and in Pilula Rhei Comp. It is also made into Tinctura Myrrhæ P B.

Dose in pill powder or emulsion 10 to 30 grains of tincture $\frac{1}{2}$ to 1 fl drachm.

SPECIAL OPINIONS—§ *Muru* (Swahili c-Africa) is not found in Indian bazars but is brought to Zanzibar from Mukulla and Arabia generally. In shape it is of a small hard black cone. Composition unknown rubbed down on an earthen plate in water to the consistence of thin gruel and taken as a drink in flatulence and dyspepsia. Is very commonly given to children and used internally and externally is said to allay the severe pain of orchitis (*Zanzibar*) (*Surgeon Major John Robb Bombay*).

The gum resin in combination with *gur* is given to increase the secretion of milk in women (*Narain Misser Hoshangabad Central Pro*).

MEDICINE
51

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| Opaque Bdellium. | BALSAMODENDRON Roxburghu |
|--|-----------------------------|
| vinces) * Myrrh as obtained in the bazars is very impure but is used to check bronchial secretion Owing to its impurity not much reliance can be placed on it (A Surgeon) In combination with dilute nitric acid I have found Myrrh a very useful application to chronic and unhealthy ulcers Its efficiency as an ingredient in expectorant mixtures is too well known to call for remark (Surgeon S H Browne Hoshangabad, Central Provinces) | |
| Balsamodendron Opobalsamum, Kunth Brandis, For Fl, 65 | 54 |
| BALSAM OF BALM OF GILEAD | |
| Vern— <i>Balasan balasan ka tél</i> HIND DUK <i>Balasan duhnul balasan</i> ARAB <i>Roghane-balasan</i> PERS The fruit <i>Habul balasan</i> (correctly <i>habbul balasan</i>) BOMB ARAB <i>Tukhme balasan</i> PERS The wood <i>Ude balasan</i> PERS BOMB | |
| Habitat.—A small branched tree found on both sides of the Red Sea south of 22° north latitude It is also recorded from several places on the Nubian coast and in Abyssinia It is met with on the Asiatic side at Ghizandad in Arabia at Aden and Yemen It is in all probability introduced into Palestine | |
| Properties and Uses— | |
| Gum —The famous Balm of Gilead or Balsam of Mecca is imported into Bombay from Arabia It is a greenish yellow oleo-resin of the consistence of honey used as a perfume and in medicine | GUM 55 |
| Medicine —The wood (<i>Ood i Balasan</i>) and the fruit (<i>Tukm i Balasan</i>) are also imported and are chiefly used as medicines by the Yunani Hakims of India The fruit is considered to be a powerful carminative and digestive it is also praised as a stimulant expectorant and is usually administered in combination with tragacanth (<i>Dymock</i>) | MEDICINE 56 |
| § Mixed with oil of roses balsam is used in earache Made into a paste with lard it is applied locally in scrofulous and cancerous sores (<i>Surgeon G A Emerson, Calcutta</i>) | |
| B Playfairu, Hook f | 57 |
| OPAQUE BDELLIUM | |
| Vern— <i>Hotai</i> or <i>hodhai</i> SOMALI DUK ARAB <i>Meena harma</i> BOMB | |
| Habitat.—Met with in North East Africa | |
| Gum resin —Yields an opaque whitish gum resin which is used as a soap by the Arabs and Somalis to kill lice and in Bombay in the cure of guinea worm (Compare with remarks under B Kataf) | GUM RESIN 58 |
| § A recent chemical examination has shown that <i>Opaque Bdellium</i> and <i>Hotai</i> are far from being identical <i>Dukh</i> the Arabic name of the gum <i>Hotai</i> (<i>Surgeon Major W Dymock Bombay</i>) | |
| B pubescens, Stocks Fl Br Ind I 529 | 59 |
| Vern— <i>Bayisa-gugul</i> MAR <i>Bayi bai</i> BELUCH | |
| Habitat.—A small tree of Beluchistan and the hills separating that country from Sind as far south as Karachi | |
| Gum resin.—It yields a small quantity of tasteless, inodorous brittle gum almost entirely soluble in water | GUM RESIN 60 |
| Medicine.—Dr J Newton reports that the gum obtained from this tree may be used in the form of ointment for cleansing and stimulating bad ulcers It is a favourite application in Delhi sores, combined with sulphur catechu and borax it is reported to stimulate healthy action | MEDICINE 61 |
| B Roxburghu, Arn, Fl Br Ind, I 529 | 62 |
| Vern.— <i>Gugala</i> BENG; <i>Gugal mhaishabola</i> BOMB <i>Gugar</i> , SIND <i>Gugal</i> GUJ, <i>Gukul</i> TAM | |

BAMBUSEÆ**Classification into Genera****GUM RESIN****63****CEMENT****64****OIL****65****MEDICINE****66****Habitat.**—A small tree of East Bengal and Assam*Properties and Uses*—**Gum-resin**—It yields a gum resin of a greenish colour moist and easily broken having a peculiar cedar like odour it is largely supplied to the Bombay market from Amrāoti and is much used by masons to mix with fine plaster (*Dymock*)**Oil**—**Baden Powell** mentions that the plant yields a medicinal oil This is in all probability the gum resin which is quite liquid and not unlike an oil when fresh**Medicine**—**Birdwood** mentions this plant in his list of drugs but gives no information as to its medicinal properties**BAMBOO****The Bamboo****67**

Probably no plants are more valuable to the inhabitants of India than the graceful gigantic grasses popularly and collectively known as Bamboos. They constitute the Tribe **BAMBUSEÆ** of the Natural Order **GRAMINEÆ**—the Grasses. The late **General Munro** in a valuable paper upon **Bambusæ** published in the Transactions of the Linnæan Society of London Vol XXVI 1870 gives an account of over 170 species. Previous to this the literature of the subject consisted of scattered publications describing the bamboos of certain regions the only complete paper having been written in 1839 by **Prof Ruprecht** in the Transactions of the Academy of St Petersburg. Subsequent to **General Munro's** account of these exceedingly valuable plants the late **Mr Kurz** of the Calcutta Botanic Gardens in the Journal of the Asiatic Society of Bengal (Vol XXXIX 88 and XLII 249) described a number of new or little known species and gave in the *Indian Forester* Vol I pages 199 335 under the title *Bamboo and its Uses* much interesting information of a practical nature. The difficulty in collecting complete sets of the leaves flowers and fruit of the same species of bamboo renders the study of the bamboos exceedingly troublesome. It must be admitted that there remains much to be done before we can be supposed to possess even an approximately complete knowledge of these most useful plants. **Bentham** and **Hooker** in the *Genera Plantarum* refer the members of the **Bambusæ** to 22 genera of which 14 have representatives in India and the Malaya. Unfortunately however the information of an economic nature is uniformly published under the generic name *Bamboo* or is at most associated with but one scientific name. It is accordingly almost impossible to refer the properties and uses of the various bamboos described by authors to their respective botanical species. On this account it has been deemed advisable to give in this place a popular account of the bamboo instead of attempting to pursue the course usually adopted in this work. The following brief analysis of the more important genera of the Indian **Bambusæ** may serve, however to direct the reader's attention to their respective alphabetical headings where fuller and more scientific details will be found —

Tribe Bambusæ

Botanic Diagnosis—Tall bushy or arborescent grasses with woody stems (the culms or halms of authors). *Leaves* flat *sheath* large *petiole* short or absent *blade* articulated and generally caducous leaving the sheath embracing the stem or branch. *Inflorescence* spicate branched and spreading panicles of fertile spikelets rarely glomerulate panicles and even spikelets sometimes bracteate. *Spikelets* pedicelled or subsessile one to many flowered. *Glumes* 2 or many empty often graduating above into the *palea* the lower pairs of which may be empty or contain only abortive or incomplete flowers. *Palea* large 2 outer and inner standing opposite each other and protecting the floret rarely absent arranged distichously on the rachis. *outer* concave or involute,

of the Indian Bamboos

BAMBUSÆ

and generally keeled those of the fertile being often quite different from the sterile flowers *inner* flat or concave 2 keeled and more delicate than the outer (The *palea* afford perhaps the most important generic character) The *florets* normally are composed of three whorls of organs arranged ternately *1st Lodicules* (or *squamules*)—3 hypogynous scales alternating with the *palea*, and 1 opposite or only 2 or absent—these may be said to correspond to the corolla *2nd stamens*—3 6 or many *3rd ovary*—sessile or spuriously stalked ovate or pearshaped with a solitary *style* and *stigma* 2 3 fid rarely entire The *florets* may be dichinous hermaphrodite or polygamous or even abortive and it is by no means unusual to find the *palea* giving origin not to a *floret* but to a *spikelet* this peculiarity producing branched and spreading inflorescences with pedunculate *spikelets* so frequent a condition in the *Bambusæ*

Sub tribe 1st ARUNDINARIÆ

Stamens 3 *Palea* 2 keeled *Pericarp* thin semi adnate to the seed

1 *Arundinaria*, Mich

Cæspitose shrubs with slender mostly annual stems rarely arborescent *Spikelets* many flowered mostly pedunculate forming racemes or panicles the branches occurring in the axils of small linear bracts which become large and amplexicaul in the species formerly referred to the genus *Thamnocalamus* empty *glumes* 1 2 inferior

Sub tribe 2nd EUBAMBUSÆ

Stamens 6 *Palea* 2 keeled *Caryopsis* small wheat like *Pericarp* thin semi adnate to the seed

* *Filaments free*

2 *Bambusa*, Schreb

Trees rarely shrubs or more rarely scandent plants growing in clumps stems tall woody *Spikelets* 2 to many flowered generally sessile in interrupted glomerulate panicles Empty *glumes* 3 4 inferior *Palea* boat shaped with ciliate keels or distinctly winged Apex of the *ovary* hairy *style* deciduous deeply 2 3 fid *Embryo* conspicuous on the surface of the fruit *Caryopsis* with a deep longitudinal furrow often adherent to the *palea*

** *Filaments united into a tube*

3 *Gigantochloa*, Kurz

Inflorescence and habit of *Bambusa* *Spikelets* many flowered *Palea* boat shaped all 2 keeled

4 *Oxytenanthera*, Munro

Inflorescence and habit of *Bambusa* *Spikelets* 1 to many flowered the terminal one only being fertile *Palea* absent or indistinguishable from the *glumes*

Sub tribe 3rd DENDROCALAMÆ

Stamens 6 *Palea* 2 keeled *Caryopsis* often very large *Pericarp* separating into an outer hard shell free from the seed

5 *Dendrocalamus*, Nees

Habit of *Bambusa* *Spikelets* 2 to many flowered panicles distantly glomerulate the flowers often only one fertile *Lodicules* none or very rarely represented by 1 2 rudimentary scales *Inner palea* boat shaped and 2 keeled *Ovary* stipitate hirsute on the apex *style* long filiform entire or 2 3 fid at the apex base persistent *Caryopsis* terete generally small *pericarp* thick position of the *embryo* generally not conspicuous

Classification
of Bamboos

69

BAMBUSEÆ.**Indian**

Classification
of Bamboos
69

6 Melocalamus, Benth

Habit of *Bambusa*. *Spikelets* few 2 flowered forming elongated and sparsely glomerulate panicles *Ovary* glabrous *Caryopsis* large (as large as a wood apple) pericarp thick fleshy (*Kurz* by mistake placed the species of this genus under *Pseudostachyum*)

7 Pseudostachyum, Munro

Sub arborescent plants with the foliage of *Bambusa* *Spikelets* few one-flowered in bracteate spikes forming open panicles Empty *glume* one inferior terminal glume also empty and globose *Caryopsis* comparatively small flattened globose pericarp crustaceous

8 Tenostachyum, Munro

Arborescent fruticose or sub scandent bamboos with the foliage of *Bambusa* *Spikelets* one flowered sub spicate forming branched panicles bracteate Empty *glumes* 1 2 inferior and terminal glume also empty and acute *Caryopsis* large acuminate beaked pericarp fleshy and when mature separating into an outer cartilaginous coat and inner layer

9 Cephalostachyum, Munro

Bushy or arborescent bamboos *Spikelets* one-flowered in numerous terminal globose or glomerulate heads protected by bracts Empty *glumes* 1 2 inferior *Caryopsis* oblong beaked pericarp thick

Sub tribe 4th MELOCANNEÆ

Stamens 6 to many *Spikelets* one-flowered *Palea* absent or the same as the *glumes* *Pericarp* crustaceous or fleshy free from the seed

10 Dinochloa, Buse

Lofty climbing woody bamboos *Spikelets* small round forming glomerulate panicles Empty *glumes* 3 4 inferior obtuse many nerved *Lodicules* none *Stamens* 6 free *Caryopsis* fleshy and berry like ovate acuminate

11 Melocanna, Trin

Arborescent bamboos with the foliage of *Bambusa* *Spikelets* bracteate arranged in unilateral compressed spikes Empty *glumes* many inferior mucronato-acuminate and not keeled becoming convolute (resembling *palea*) above *Lodicules* 2 *Stamens* 6 free or more or less connate *Caryopsis* very large pericarp thick and fleshy

12 Ochlandra, Thw

Arborescent bamboos *Spikelets* large densely capitate or sub-spicate Empty *glumes* 3 to many inferior *Lodicules* very irregular *Stamens* most frequently 6 or many filaments variously connate *Caryopsis* large with a thick fleshy pericarp

HABIT AND GROWTH OF THE BAMBOO

Under each of the Genera briefly defined in the preceding pages one or more species of gigantic or even arborescent grasses have been described by botanists each of which may popularly be known as Bamboo. Most authors however speak of *Bambusa arundinacea* as the bamboo an expression which is quite incorrect since the spiny bamboo of South and West India is by no means either the most useful or most abundant

Bamboos.

BAMBUSEÆ

species in India as a whole. It is quite customary also to read of *Bambusa vulgaris* as the common bamboo whereas in India, at least, this cultivated Eastern species is by no means a common plant. It would be more correct to speak of *Bambusa Tulda* as the common bamboo and as far as Bengal is concerned it certainly is the most abundant species while *B. Balcooa* is nearly as plentiful and is much more useful having also a wider distribution. On these grounds it would by the majority of the natives of India be pronounced the bamboo. The term male bamboo may be said to be applied to any solid bamboo used for spear or lance staves walking sticks &c. it is more particularly applicable to *Dendrocalamus strictus*. The stamens and pistil being on the plant it is difficult to see why the term male should be given to a solid and female to a hollow bamboo but they are expressions in frequent use in India.

As with all other grasses the bamboo stem consists of a more or less hollow culm with transverse solid joints called nodes. The thickness of the woody shell and the length of the internode varies exceedingly in the different species. One peculiarity is preserved by all bamboos namely the rapid growth of the young shoot. Running up to its full height before the branches are produced the shoot at the same time attains its full thickness immediately on escaping from the ground. This is a most important provision for otherwise the branched culm could never penetrate through the crowded mass of its associates. Having in about a month reached its full height the shoot commences to produce its branches and branchlets and thus weighted it curves into the graceful plume which is the elegant and familiar feature of the plant. At the same time the large sheathing leaf scales of the young shoots give place to the mature and distichously arranged leaves. These owing to their horizontal position and the concavity of their upper surfaces keep rustling and trembling with every passing breeze. As a rule the bamboo is gregarious establishing itself so thoroughly over certain portions of wild forest clad tracts that it exterminates all other forms of vegetation. Seen from a height nothing could be more lovely but to the traveller who for days together may have to clear a path for himself the interminable monotony and the twilight shade and death like stillness broken only by the sighing of the grating culms make the bamboo jungle dreary in the extreme. However in mixed forests an occasional bamboo clump has a most pleasing effect. It supplies the traveller moreover with some of his most essential materials of equipment. Indeed in a bamboo tract tents may be dispensed with for through the expert handling of the bamboo the camp follower armed with a large knife can in less than an hour erect a most comfortable hut and furnish it with beds tables and chairs all constructed from the bamboo.

Popularly bamboos may be divided into those which grow in separate clusters or clumps and those which grow in a more continuous manner. The former are characteristic of the tropical and the latter of the extra tropical or temperate forests. The clumped forms give to the soil a curious undulated appearance each elevated mass consisting of the old stems or rhizomes and the entangled and tufted roots with the earth gathered around them. In many localities ant hills surround the bamboos to a height of several feet ultimately proving fatal to the plant which however for a time appears to grow from the top of the elevated mounds. Each clump consists of from 30 to 100 culms which attain a height of from 30 to 100 or even 150 feet. In the scattered forms the culms rarely rise singly from the rhizome but form small clumps containing only a few culms the clumps being so closely packed together as to form impenetrable jungles. These latter are smaller in thickness and height,

Male
Bamboo.
71

Peculiarities
of habit.
72

BAMBUSEÆ

Indian

and are generally solid collectively they are known as hill bamboos A few species are climbers their festoons and pendulous boughs passing gracefully from tree to tree

The home of the giant forms of bamboo may be said to be in the tropical and extra tropical forests on entering the temperate zones they dwindle down to mere under shrubs until ultimately they are scarcely distinguishable from other grasses

73

THE STEM OR CULM

For about two-thirds of its over portion the culm is unbranched or possesses only very short and inconspicuous branches As already stated on escaping from the ground the shoot attains at once its full diameter appearing like a great scaly cone clad in large embracing sheaths The shoots and leaf scales afford the most important popular and practical characteristics for recognising the different species of bamboo Solid stemmed bamboos are as a rule much smaller than hollow ones but bamboo culms may be said to range from the thickness of a goose's quill to more than a foot in diameter Until the branches have been fully developed the culm is not mature this generally occupies a variable but considerable period the shoot attaining its full height in from 30 days to 2 or 3 months The branches are produced from below upwards and with their appearance the stem gradually matures A good deal has been written as to the rate of growth of the shoot but up to the present date exact and definite figures even for the important species cannot be obtained It is probable that an average of 3 inches per day would not overstate the growth of the young shoots of the more important bamboo This seems also in the majority of species to take place chiefly at night and to continue for a month pretty uniformly being increased if anything during fine clear days and retarded apparently in damp and cloudy weather The period of sprouting is generally about the beginning of the rains Captain W H Sleemann says In the rains of 1835 my bamboos at Jubbulpore had not thrown out their shoots at what I considered the usual time and I asked my gardener the cause He replied

Rate of
growth
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We have had no *thunder* yet as soon as the thunder comes you will get shoots I asked him what possible connection there could be between the sound of thunder and the shooting of the bamboos God only knows said he but we know that till the thunder comes the bamboos never shoot well The thunder came and certainly the gardener's theory seemed to me to be confirmed by a very steady and abundant shooting of the bamboos This same belief is very generally entertained by the natives of India and as remarked by Mr Kurz the observation may be a perfectly correct one the phenomenon depending upon the greater amount of nitrogen compounds in the atmosphere during electric discharges Repeated cutting of too many bamboo-shoots considerably weakens the stock while the cutting of full grown culms does not more injure them than mowing does the grass Indeed it is believed that too much cutting of shoots results in early flowering of the stock itself and such means in most cases death to the whole plant (*Kurz Indian Forester I 257*) This statement is in keeping with a very general opinion (see *Bombay Gazetteer XV Pt I 63*) that the year before flowering the large bamboos cease to send up shoots Besides it has an important bearing upon the question of the application of the bamboo for the manufacture of paper—young and not mature culms being necessary for that purpose (See page 378—*Bamboo as a Paper Material*)

The number of shoots produced yearly from each clump varies according to the vigour of the individual and the peculiarities of the

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species Kurz states that the larger species produce 12 to 20 and the smaller 30 to 50. If we assume say only 10 per stock a year we should get as many as 300 halms to the stock in 30 years which is the mean age of most of the bamboo species at which they begin to flower and die off while 50 and fewer halms to a bamboo-stock is a very dense growth even in those primeval forests where the axe of man does not touch them.

PECULIARITIES OF BAMBOO STEMS

It is by no means unusual to find the greatest variation in the colour of bamboo stems. Some are dark green as in *Bambusa Tulda*, yellow and even striped yellow and green in *B vulgaris*, bluish with rough internodes in *Arundinaria racemosa*, and pale glaucous with blue rings at the nodes in *A Hookeriana*. Many species when young are covered with a tomentum of closely adpressed hairs or whitish powder which in many cases forms a useful character. It is best seen upon the young scales. Solidified buds are developed into formidable recurved spines in *Bambusa arundinacea* and *B spinosa*, while many of the hill bamboos produce below the sheath on the lower half of the culm a whorl of rootlets which harden into spinescent bodies. These are popularly called the spiny bamboos. This root spinescent tendency was found to be developed to a formidable extent in the hill bamboo on the Burma Manipur frontier especially on the Kassome hills beyond the Kaboo valley. Most bamboos show a tendency to flattening above the nodes especially where buds are developed. This is apparently what has been taken advantage of in the production of what is known as the cultivated square bamboo of China. Interesting information regarding this curiosity will be found in the *Tropical Agriculturist* (April 1884 p 698 reproduced from *N C Herald*) from which the following passage may be extracted. Pre-eminence is assigned to the square variety of this most useful as well as ornamental plant which has been a favourite in imperial gardens wherever its acclimatisation has been effected in the north. The EMPEROR KAO TSU once inquired of his attendants who were planting bamboos concerning the various kinds. In reply he was informed respecting several remarkable species. Chékiang in particular furnished one that was an extraordinary curiosity in that it was square and for that quality and its perfect uprightness was much esteemed by officers and scholars. They also told him that it was used for many purposes of decoration and utility including among others that of being made into ink slabs.

DURABILITY OF THE BAMBOO

This depends in the first instance upon the culms being cut when mature. Specific peculiarities render some culms more durable than others as for example the thickness of the woody shell and the amount of silicious matter deposited within the tissue. In this latter respect bamboos vary exceedingly. Long immersion in water greatly enhances the durability rendering the stem less liable to the attacks of insects owing to the sap which the insects are fond of being thus extracted.

FLOWERING OF THE BAMBOO

A great deal has been written regarding this exceedingly curious and interesting peculiarity. The inflorescence exhibits many important variations most of which have been accepted by botanists as generic characters. All the species commence to flower when in full leaf but as the inflorescence expands the leaves as a rule fall off until when in complete

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Bamboos
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flower the clump or certain portions of it are leafless. In some cases special flowering culms are produced at other times every culm flowers the flowering portion or the entire clump dying off after the seeds are mature. In a few instances the plant continues to flower as a perennial while some bamboos are entirely annual flowering and dying down to the ground every year. With all the larger species the flowering stage is reached after a prolonged period of vegetation variously stated at from 25 to 35 years and is almost regularly followed by the death of the whole stock. Captain Sleeman in the *Trans Agri Horti Soc of India III 139* dated 1836 publishes a most interesting letter containing the main facts of all that is known even at the present day regarding this subject. It may be well to reproduce a portion of this most valuable letter —

All the large bamboos whose clusters and avenues have formed the principal feature in the beauty of Dehra Doon ever since the valley became known to us or for the last quarter of a century have run to seed and died this season as well those transplanted from the original stock last season and those transplanted 20 years ago. This is the character of the bamboo all the produce of the same seed will run to seed and die in the same season without reference to the season in which they may have been transplanted from the original stock and unless we have them from different stocks we shall always be liable to lose all that we have the same season and to have our grounds deprived for eight or ten years together of what may have been their principal ornaments for the bamboo does not in less time attain its full size and beauty. The shoots of the first season come up small whether they be from the original stock or seed or from transplants from the original stock. We may take from the original stock bamboos six inches in diameter with a sufficient portion of the roots and transplant them but the shoots of the first season from this stock will still be very small those of the second season will be larger those of the third larger again and so on till in about eight or ten years they attain their full size. It is well known that bamboos do not increase in diameter after they come above ground they shoot out as thick as they are to be and increase only in length after they come up. What is the ordinary age of the bamboo I know not but the people of the hill and jungly tracts of Central India calculate ages and events by the seeding of the hill bamboos a man who has seen two *Kutungs* or two seedings of the bamboo is considered an old man—perhaps sixty years of age.

Bambusa arundinacea is the common species in the Dun and all these flowered in 1880 assuming that Captain Sleeman alludes to that species these dates would give 44 years as the period required to reach flowering.

Another correspondent in the same volume writes Field rice is selling at 16 seers local weight per rupee and bamboo rice at 20 seers. This bamboo I am told does not bear seed every year nor at any fixed periods. The sign of bearing showed itself last year after I am informed a lapse of 20 years and some very old people could not call to their recollection when prior to the former event bamboos had borne seed perhaps encouraged by particular circumstances connected with elemental changes they spontaneously fecundate for it does not appear to me that the matured bamboo only bore seed but young and old together from the lowest stem to the highest points—a circumstance which does not admit of the belief that it follows the regular course by which nature governs the other orders of vegetation. This of course is a conclusion only from apparent causes for I have not had time to investigate the fundamental cause or law by which it is influenced and native traditions are rather incoherent and speculative to lead to

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any satisfactory conclusion. Superstition which seizes on everything however trivial as a material with which to manufacture a portent assigned to the appearance of the seed a certainty of impending famine for say the Brahmans. *When bamboos produce sustenance we must look to heaven for food.* But for the hundredth time perhaps is Brahminical prescience belied for never was there a finer crop of rice on the fields than at present. It would not be surprising however if the common and intended meaning of the prophecy be hereafter denied for bearing as it does a double meaning like many of the responses of the Pythian oracle the incorrect reading may be ascribed to ignorance.

Each bamboo bears from 4 to 20 seers which assigns to it in my opinion a character of extreme fruitfulness considering the close and compact order in which the bamboos grow. Soon after bearing the bamboo seems to have fulfilled its career and dies but the roots again send forth offshoots to perpetuate the species on the same ground nor is it in this manner only that it is propagated for the seed germinates as I have tried and have not the least doubt that a plantation may be raised from it. (*J. B. Jones in Trans. Agri. Horti. Soc. India, III 143*)

Beddome is of opinion that *Bambusa arundinacea* generally flowers at an age of about 32 years he having ascertained that in Western India it flowered in 1804, 1836 and 1868 but Dr Brandis adds that this species also flowered in Kanara in 1864. The most animated discussions have been published as to whether the bamboo flowers when it attains a definite age or only at any period when mature provided the circumstances of the season are favourable. In his *Himalayan Journal* Sir J. D. Hooker seems to favour the latter theory but there are many facts which go to support the former. Both may be true and this is probably the wiser solution of the difficulty—that is to say a bamboo may not flower before it has attained a certain age but its flowering is not fixed so arbitrarily that it cannot be retarded or accelerated by climatic influences. It is an undoubted fact that the flowering of the bamboo is decidedly influenced by the causes which bring about famine for the providential supply of food from this source has saved the lives of thousands of persons during several of the great famines of India. Captain Sleeman very wisely suggests that it would save the complete destruction of the bamboos of a district to introduce seedlings obtained from stock in other districts. It appears certain that it is immaterial whether cuttings are taken a few years or many years before the flowering the parent or stock plant as well as plants raised from cuttings will all flower and die at the same time. Indeed it has been shown that cuttings taken a year or so before the flowering if unable to produce flowers nevertheless die with the rest. This curious fact seems to indicate that the life of the plant is perfectly fixed and is renewed only by seed. The introduction of two or more batches of seedlings from remote districts into each forest would seem to be an expedient that might fairly well claim the attention of the forest authorities but it would deprive the people to a large extent during times of scarcity of the chance of obtaining a crop of bamboo grain. It would be intensely interesting to have the facts relating to bamboo flowering carefully recorded every year all over India. Do all the forests for example of a certain bamboo in India, exhibit a tendency to flower at once or is there any relation between the periods of flowering of the same species in different parts of India? It seems likely that each of the recorded periods of flowering were in reality the times of flowering of different species of bamboo and are thus relatively of little importance. The natives of some parts of India say the flowering can be averted by cutting down all the bamboo the year before the flowering is

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expected It is difficult to see how this can affect the plant At most it can only retard the flowering for a year or so and it is equally difficult to understand how it can be known when flowering is to take place

PROPAGATION OF BAMBOOS

This may be effected—

1st By Seed—This is the slowest but most effectual process The ovary (surrounded by the lodicules and palca) drops from the plant and readily germinates usually within the first week after reaching the ground Some species germinate while the seed is still attached to the plant the young seedling dropping from the parent when about 6 inches in size Nothing is known as to the period of vitality of the bamboo seeds but if carefully collected and matured in the usual way they may be sent from one part of India to the other in good condition This of course applies only to those which fall from the plant before germinating Propagation by seed is the most certain plan but the plant requires 10 to 12 years to attain a growth sufficient to admit of cropping

2nd By Cuttings—This is the process most frequently adopted in India The lower part say 3 feet in length of a growing half mature stem is placed in the ground shortly after the commencement of the rains This is most frequently cut off so as to leave if possible a portion of the rhizome attached The cutting should be made a little below one of the nodes and buried so as to include this and the next node Some times the cuttings are laid lengthwise along the ground on a specially prepared soil and the sproutings at each node with their rootlets are afterwards separated and transplanted to their final positions

PROPERTIES AND USES OF THE BAMBOO**FIBRE AS A PAPER MATERIAL**

References—*Routledge—On Bamboo considered as a Paper making Material Kew Reports 1877 p 35 and 1879 pp 33 34 Dr King's Reports of the Botanic Gardens Calcutta for 1877 1878 and 1879 Spens Encyclop Official correspondence with Forest Department*

**Fibre
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Of all the fibre yielding plants known to botanical science there is not one so well calculated to meet the pressing requirements of the paper trade as Bamboo both as regards facility and economy of production as well as the quality of the *paper stock* which can be manufactured therefrom grown under favourable conditions of climate and soil there is no plant which will give so heavy a crop of available fibre to the acre and no plant which requires so little care for its cultivation and continuous production These are the opening sentences of **Mr Routledge's** most useful and interesting little book on *Bamboo as a Paper making Material* published in 1875 That young bamboo shoots can be used in this way is now an established fact and great credit is due to **Mr Routledge** for the energy and persistence with which he has advocated the claims of Bamboo fibrous stock to the paper manufacturers While this is so there are practical difficulties which seem likely to prevent bamboo from ever taking the place which the study of the prepared fibre apart from the plant would naturally suggest for it The structural differences between monocotyledonous and dicotyledonous plants have repeatedly been pointed out in connection with the subject of the fibres obtained respectively from certain members of these sub-kingsdoms In the former the bundles of vessels are isolated and pursue a curiously curved course through the stem growing at the upper extremity upwards and outwards and at the lower downwards and outwards This curvature gave rise

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to the mistaken idea of internal growers or endogens. The vital difference between the two classes of stems is found chiefly however in the vessels which in both cases take their origin at the growing point of the stem. In the monocotyledon they remain quite distinct from each other being simply imbedded amongst loose cellular tissue. They have a pronounced tendency to elongate but do not enlarge very much in thickness. In the dicotyledonous plants the fibro-vascular bundles on the other hand steadily increase in thickness and as a consequence they coalesce together forming zones of woody tissue. The young outer layer including the bark is thus the only portion of the dicotyledonous stem which can conveniently be reduced to fibre whereas the great bulk of the monocotyledonous stem is amenable to the agencies now employed by the manufacturer for the production of fibre. It thus follows that not only have dicotyledonous stems to be subjected to an elaborate process for the purpose of separating wood from bark and of liberating the fibres of which the bark is composed but only a small percentage of the crop obtained from the field actually goes to fibre. These are powerful arguments no doubt in favour of bamboo and other monocotyledonous fibres for paper trade. The yield of flax per acre is about 5 cwt hemp 7 cwt jute 5 or 6 cwt and cotton much less while about 10 tons can according to Routledge be obtained from an acre of bamboo jungle. The paper manufacturer cannot afford to give the prices which can readily be commanded by any prepared fibre. Esparto which may be directly placed in the pulping pans might not incorrectly be taken as the type of fibre required by the paper trade. The increasing demands for this grass which already exceed the supply have forced upon the world the serious problem of finding a substitute and for some time the greatest hopes were entertained that immense expanses of almost waste bamboo jungle in India would be rendered available thus meeting the industrial wants and at the same time opening up a new source of revenue to the country.

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OBJECTIONS TO BAMBOO AS A PAPER FIBRE

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It is very much to be regretted that the great expectations as to the future application of the bamboo to the requirements of the paper trade were frustrated by practical obstacles which Mr Routledge did not apparently foresee. These may be briefly stated —

1st —The young shoots only being serviceable for paper making three serious difficulties arise (a) the bamboo shoots appear from June to July and are in condition during August and September but by the end of October they are too old (b) the stock is found to suffer severely from the removal of the shoots (c) each clump can yield only about three or four shoots a year. Experience has shown that this is about the full number which each clump can be supposed to yield. The shoots that are removed must not be cut close to the ground otherwise the plant suffers still more severely.

2nd —Experiments seem to have failed to induce the bamboo to produce a continuous supply of shoots throughout the year.

3rd —It was found that a large percentage of old stems required to be left on the stools otherwise the plant was in time killed and that the same danger existed in the complete removal of the young shoots. This would necessitate a methodical working of the jungles and thus considerably increase the charges of collection and transport. Dr King has demonstrated (in *Reports of the Royal Botanic Gardens Calcutta 1877-80*) that if all the shoots be removed for three successive years the plant is killed. This danger may be averted for a time by systematic working of the clumps, but does not appear to be curable.

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4th—During the months in which the bamboo shoots appear the climate of the most important bamboo forests is such that labour could not be obtained. In fact bamboo forests occupy as a rule uninhabited districts rendering the labour question apart from the dangers to human life one of the most serious difficulties.

5th—The freight and transport charges incidental to all raw products which have to be conveyed for long distances are very considerable. In fact, owing to the scattered nature of the clumps which form bamboo jungles human labour would be the only means of collecting the material to points from which it could be conveyed to the factory.

6th—A most unexpected difficulty which in itself almost renders the bamboo unsuitable for paper making exists also in the hard adpressed hairs which cover the scales and young stems. It has been found impossible to remove these and they are not only dangerous to the men employed but injure the paper seriously.

83**EXPERIMENTS IN CULTIVATING BAMBOO AS A PAPER FIBRE**

An experiment was however undertaken in Burma and the terms of a concession discussed by Government some few years ago. **Mr Routledge** found that paying Rs 15 a thousand for the shoots landed at Rangoon he could prepare fibre at a price that could be given by the paper manufacturer. A thousand green bamboo shoots weigh about 8 tons and losing 75 per cent in moisture they yield 2 tons of dry fibre. He thus paid about 30s for the materials from which two tons of fibre were prepared. To this must be added the charges connected with the separation of the fibre and the shipping and freight to Europe.

A point of great importance and one which must not be overlooked is that the bamboo shoots must be reduced to fibrous stock in India. Various proposals have been made to meet this difficulty. One that floating machinery should be conveyed up and down the rivers to convenient places near the forests and that the crushing or the first stage of the process of manufacture should be conducted in this manner on board flats. The ribbons of crushed bamboos are however very subject to destructive fermentation being rapidly rendered useless. If not reduced at once to dry fibrous stock the greatest possible care must be taken to see that the ribbons are conveyed in safety to the factory where they are to be reduced to fibre.

The idea of floating the young shoots down the rivers to some healthy situation where a factory could be located has also been discussed and if practicable from the manufacturer's point of view this would only have to contend against the dangers and difficulties in the forests.

Another proposal is to have machinery which could be put down in the jungles and moved from place to place as required. The obvious objection to this is the danger to human life from the malarious nature of the forests and the expense and danger of conveying heavy machinery through wild tracts of country where there are no roads.

Mr Routledge seems to be most in favour of the idea of selecting a healthy district where a large plantation could be opened out around the factory and an elaborate system of irrigation might be adopted to force the growth of the bamboo. This seems to completely ignore questions of a vital nature if the land were good and favourably situated with reference to facilities for exportation it would never pay to put it under bamboo cultivation and if not so favoured it might be possible to make the bamboo grow, but quite another matter to make the factory a profitable undertaking.

Besides, there are many other fibres which in all probability would be

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found much more profitable to cultivate in the way **Mr Routledge** proposes than the bamboo. The Nepal paper plant for example would seem to be the fibre which should attract the most attention in the future. It has been long overlooked by Europeans chiefly through the success of jute and other annual plants suited to the plains of India.

Mr Routledge deserves every praise however for the manner in which he has urged the claims of bamboo as a paper material and although the matter seems to have attracted less attention of late it has not by any means been finally disposed of. Paper has been made both in India and China from the bamboo indeed in China it is the principal if not the only material for paper making and was there used as such when our forefathers were savages (*Kurs*).

In an official correspondence with the Government of India **Mr J Sykes Gamble** writes regarding the Chinese method of preparing paper from the bamboo. I would suggest that the Chinese method of making paper from pulp obtained from mature bamboos is more likely to pay than that proposed by **Mr Routledge** of using only the young succulent shoots. The method of preparation of the fibre employed by the Chinese is given at page 255 of Vol IV of the *Indian Forester* of which the following is an extract. The method of preparation from bamboo is as follows. The bamboo is stripped of its leaves and split into lengths of three or four feet which are packed in bundles and placed in large water tanks each layer of bamboo is then covered with a layer of lime water is poured on till the topmost layer is covered. After remaining in this condition three or four months the bamboo becomes quite rotten when it is pounded into pulp in a mortar cleansed and mixed with clean water. This liquid is poured in quantities sufficient for the size and thickness of the sheets required upon square sieve-like moulds. These sheets (of which a skilful workman can make six in a minute) are allowed to dry then taken from the mould and placed against a moderately heated wall and finally exposed to the sun to dry. The best quality is made from the shoots of the bamboo with alum added to the infusion the second from the bamboo itself though a higher grade of this quality is attained by the previous removal of the green portion.

It has been repeatedly proved by European manufacturers that the bamboo shoot can compete with other paper yielding substances. Both in America and Europe thousands of tons of bamboo fibre (supplied from the West Indies) have been made into excellent paper. Efforts have been made in Brazil to utilise the fibre for textiles in mixture with wool and silk (*Spons Encycl*).

The obstacles to the establishment of bamboo as an industry are of a practical nature but they are such as might be expected to give place to a pressing necessity for more fibre. So long as this is not the case there does not appear to be much chance of the trade in bamboo fibre assuming the form of an established industry. For the convenience of those interested in the subject the following extracts from **Mr Routledge's** little book may be republished in this place. 'An essential point in my system for treating Bamboo to produce therefrom fibrous paper stock consists in operating upon the stems of the plant when young and preferably when fresh as and when cut and collected.

Brought therefore to a central factory in this condition the stems are passed through heavy crushing rolls in order to split and flatten them and at the same time crush or smash the knots or nodes. The stems thus flattened are then passed through a second series of rolls which are channelled or grooved in order further to split or partially divide them longitudinally into strips or ribbons these being cut transversely into convenient lengths by a guillotine knife or shears are delivered by a

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carrier or automatic feeder direct to the boiling pans or elsewhere as desired

As the object of my process is to produce a fibrous or tow like *Stock* retaining as far as possible the normal or natural condition of the fibre and not *Half stuff* or *Pulp* my system of treatment differs materially from the ordinary process of preparing fibres more especially in the boiling and washing processes.

Both of these processes I conduct in a battery or series of vessels (16 20 or more in number) such vessels being connected together by pipes or channels furnished with valves or cocks so that communication between the individual vessels may be maintained disconnected and regulated as desired in such manner that the vessels being methodically charged in succession with the material to be operated upon the heated leys (composed of caustic alkali) can be progressively conducted from vessel to vessel of the series passing over and through the material placed therein

The leys are thus used again and again (each successive change or charge of ley carrying forward the extractive matters it has dissolved from the fibre with which it has been in contact) until exhausted or neutralised (when they are discharged) fresh leys being methodically and successively supplied until by degrees the extractive matters combined with the fibre or fibrous material have been rendered sufficiently soluble when hot water for washing or rinsing is in the same continuous manner run successively from vessel to vessel over and through the material contained therein until the extractive matters rendered soluble by the previous alkaline baths have been carried forward and discharged leaving the residuary fibre sufficiently cleansed

By this system of boiling in continuity until all the effective alkali in the leys is exhausted or neutralised I realise an economy of from 30 per cent to 40 per cent of soda over the ordinary process of boiling and by the subsequent washing or rinsing in the same continuous manner without removing the material from the vessels the normal structure of the fibre is in a great measure retained waste is minimised and thus while being thoroughly cleansed and freed from extraneous matter the strength and staple of the fibre are preserved a considerable saving of fuel results from the heated liquors being used again and again less steam being required as also less water while at the same time economy of both labour and power is effected over the ordinary system

Assuming the boiling and succeeding washing processes to be concluded and the material (Bamboo) in one of the vessels of the series in its regular succession to be found sufficiently treated and cleansed a final cooling water is run on and through the fibre which is then drained and the contents of the vessel (disconnected for the time being from the series) emptied into a waggon running on a railway by which it is conducted to a press or otherwise to abstract all the remaining moisture possible

The dry or semi dry fibre is then submitted to the action of a willow or devil by means of which it is opened or teased out and converted readily into a tow like condition when it is dried by a current of heated air induced by a fan blast and finally baled up for storage or transport in a similar manner to cotton or jute

In this condition of *paper stock* it may be kept an indefinite length of time without injury and when received by the paper manufacturer requires merely soaking down and bleaching to fit it for making into paper either by itself or used as a blend with other materials as desired" (*Mr Routledge's Bamboo considered as a Paper making Material pp 12 14*)

Much has been written for and against the idea of practically utilising our vast bamboo forests as a supply for paper but the present position may not incorrectly be described as a controversy of opinions which have

Bamboo Manna.

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not been put to a practical test. Experiments of sufficient magnitude have not as yet been undertaken to ascertain whether or not Mr Routledge's proposals can be practically carried out in India. If cheap machinery could be invented suitable for the preparation of the fibrous stock one would be inclined to hope that the smaller proprietors of bamboo jungles might take to preparing the fibre. Indeed past experience would seem to justify the opinion that the native and not the European is the proper person to look to for the cultivation and preparation of fibres.

MEDICINE

In the interior of the hollow stems of some bamboos chiefly *Bambusa arundinaceæ* a silicious and crystalline substance is found known in the bazars of India as *Tabashir* or

MEDICINE
Tabashir
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BAMBOO MANNA

Vern—*Bans lochan bans kapur* HIND *B ns kápur* BENG *Thstoriya*
ASS *Vansa lichana venu lavanani* SANS *Tabash r* ARAB and
PERS *Banasa lichana banasa misha* MAR *Vans kapur vas nu misha*
CUJ *Munga luppu* TAM *V duruppu* TEL *Moleuppa* MALA
Bidaruppu *tavakshir* KAN *Und lunu una kapura* SINGH
Vá-chha *vathiga kiyu vathegasu vasan* BURM

There are two varieties of *tabashir* known in the bazars viz *kabudi* blue and *sayed* white the former is only pale blue.

The following interesting historical account of this substance is extracted from Sir George Birdwoods *Bombay Products*. *Tabasheer* is an article of the greatest antiquarian interest as *Salmasius Sprengel* and *Fee* are of opinion that it is referred to and not sugar by the ancients—*Dioscorides* and *Pliny* for example where they mention *σακχαρον* and *Saccharum*. *Salmasius* states that the *Saccharum* of the ancients as described by them had none of the properties of sugar and was used in ways sugar never could be and in another place that the *σακχαρον* of the Greeks was *tabasheer* beyond all controversy. Against this dictum the line in *Lucin* has been cited—*Quique bibunt tenera dulces ab arundine succos* as if the bamboo could be a *tenera arundo*. But *Salmasius* quotes this very line and yet goes on to show by arguments one finds it difficult to refute although common sense would reject the conclusion that cane sugar was unknown to the ancients. One would think *Pliny's* description left little room for doubt yet *Salmasius* by means of a comma alters its whole meaning. The passage is as follows *Saccharon et Arabia fert sed laudatius India est autem mel in arundinibus collectum gummiu modo candidum dentibus fragile amplissimum nucis avel lanæ magnitudine ad medicinæ tantum usum*. But says *Salmasius* *ita hæc distinguenda collectum gummiu modo non ut est vulgo gummiu modo candidum Hæc omnia prorsum quadrant in tabascir vel saccharum mambu*—It is white brittle to the teeth is collected in reeds is sweet (!) and useful in medicine. *Dioscorides* says What is called *σακχαρον* is a kind of concrete honey found in reeds in India and Arabia Felix in consistence like salt and brittle between the teeth like salt. Takendissolved in water it is borne by the stomach &c. It is difficult to deny that sugar is not here meant and very hard to allow that *tabasheer* is *Pliny* copying from *Dioscorides* as is plain perhaps confused *tabasheer* with sugar in his description and thus has involved the passage in obscurity. The President of the Bombay Branch of the Royal Asiatic Society has suggested to the compiler a reading of *Pliny* as ingenious as that of *Salmasius* and probably more just inasmuch as it supports the common sense view in the Sugar Controversy. Placing a full

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Tabashir
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stop where the first semicolon occurs the **Honorable Mr Frere** reads the passage as follows *Saccharon et Arabia fert sed laudatus India Est autem mel in arundinibus collectum &c* As if **Pliny** on mentioning at once dismissed so familiar an article as *Saccharon* and then went on to describe in detail so rare a substance as *tabasheer* must have been **Fee Sprengel** and **Humboldt** simply follow **Salmasius Humboldt** very diffidently A passage from his *Prolegomena de distributione Geographicæ Plantarum* (quoted in his *Cosmos*) states an opinion all on reading the whole controversy on sugar will probably acquiesce in and is on other accounts worth introducing here *Confudisse videntur veteres saccharum verum um Tebaschiro Bambusae tum quia utraque in arundinibus inveniuntur tum etiam quia vox sanscradana sacharkara quae hodie (ut Pers Schakar et Hind Schukur) pro saccharo nostro adhibetur observante Boppio ex auctoritate Amarasinhæ proprie nil dulce (madu) significat sed quicquid lapidosum et arenaceum est ac vel calculus vesicæ Verisimile igitur vocem sacharkara duntaxat tebaschirum (succur nombu) indicasse posterius in saccharum nostrum humilioris arundinis (ikschu kandeschu kanda) ex similitudine aspectus translatum esse Vox Bambusae x mambu derivatur ex kanda nostratum voces candis zuckerhand In tebaschiro agnoscitur Persarum schir h e lac Sanscr Kschiram The Sanscrit name for *tabascher* is *tvakkschirá*, bark milk **Herodotus** (Book XIV ch 194) writing of the Gyzantians observes that in their country a vast deal of honey is made by bees very much more however by the skill of men In a note **Rawlinson** states Bees still abound in the country and honey is an important article of commerce A substitute for honey is likewise prepared from the juice of the palm **Sprengel** states that the sugar cane is first mentioned by **Abulfaidil** 13th century and sugar by **Moses Chorenensis** A D 462 and notwithstanding that it must the writer would apprehend be mentioned in Hindu books of a far earlier date it is not a little remarkable that a Hindí name of sugar is *Cheene* (*Birdwood's Economic Products of the Presidency of Bombay* pp 95 96)*

Tabashír is largely used by Hindús and Mohammedans and is considered cooling tonic aphrodisiac and pectoral It is an ingredient in many compound medicines which are given in different lung diseases Sanskrit writers describe it as sweet i e not bitter (*Dymock Mat Med W, Ind 697*) The most complete account of its varieties history formation and properties has been published by **Sir David Brewster** (*Philosoph Trans 1819 and Edin Journ of Science Vol VIII p 286*) and in the same paper are embodied some earned remarks by **Prof H H Wilson** on its nomenclature and the uses to which it is applied by the natives drawn from Sanscrit works It is highly prized in native practice as a stimulant and aphrodisiac but from its composition we are warranted in believing that as a medicinal agent it is inert (*Pharm of India*)

The deposit called *Bansolochan* (or *tabáshír*) is supposed to be efficacious in paralytic complaints flatulency and poisoning cases It is highly prized in native practice as a stimulant and aphrodisiac It is supposed to be cool and to remove thirst and therefore useful in fever jaundice and pulmonary affections The Baigas of the Central Provinces are said to be very clever at detecting bamboos in which this *bansolochan* or *tabáshír* is likely to be found The substance holds a high reputation as a febrifuge and accordingly fetches in these Provinces a good price (*Gazetteer*)

It seems probable that *tabáshír* is an after product from the natural sap of the bamboo which gives to the young shoots their peculiar flavour This has not been clearly established however, nor indeed has the process of the excretion been looked carefully into by modern botanists and accordingly rather conflicting statements occur in the writings of authors

Chemical Composition of Tabashir

BAMBUSEÆ.

upon this subject My friend Mr Peppe, of the Opium Department informs me that he knows a native merchant who made a large fortune upon *tabashir*. He examined very carefully the bamboos that were found to contain the salt and came to the conclusion that its formation was due to the action of an insect that perforated the bamboo. He tried to imitate this action with the result that he found that by making a small perforation above a point in half mature bamboos the salt formed freely. This he practised systematically and made a considerable sum of money before he finally glutted the market with *tabashir*.

The following extract from La Maout and Decaisne's *System of Botany* seems to convey an entirely mistaken idea. The young shoots of these two trees (*Bambusa arundinacea* and *B. verticillata*) contain a sugary pith which the Indians seek eagerly when they have acquired more solidity a liquid flows spontaneously from their nodes and is converted by the action of the sun into drops of true sugar. The internodes of the stems often contain silicious concretions of an opaline nature named *tabasheer* (a substance presenting remarkable optical properties). What could possibly be alluded to as the true sugar it is difficult to see certainly no Indian bamboo has ever been observed to do so and the only excretion is *tabashir* which as stated is deposited in the interior of the nodes. Kurz in his paper on Bamboo and its uses however speaks of the fluid within the bamboo stems. The water which often accumulates in the bamboo-joints especially of very hollow kinds is used against bowel complaints with what success I cannot say but all I can add is that this water in the bamboo halms like that found in the pitchers of the *Nepenthes* has often quenched my thirst during my tours in the Java hills. This fluid sap within young bamboo stems may be the source of the true sugar alluded to in the above passage but in India at least neither has the fluid sap been seen in such abundance as described by Kurz nor has the spontaneous excretion of sugar on the outside of the stems ever been recorded by Indian travellers.

§ There are two varieties sold in the bazars a white and a bluish white. Mixed with honey it is used locally in aphthæ. Some hakims say that if this drug be used for any length of time it is apt to induce impotence. (Surgeon G. A. Emerson Calcutta). The white variety has been calcined. (Surgeon Major W. Dymock Bombay).

Cooling medicine generally given in fever to assuage thirst also expectorant 5 to 20 grains. The cooling *churna* is prepared by mixing together 8 parts of *vansa lochana* 16 of *pimplee* 4 cardamoms one of cinnamon with a sufficient quantity of honey or ghee. Dose of the powder one to two scruples. (Surgeon W. Barren Bhuj Cutch Bombay).

Used as a medicinal ingredient in cases of diarrhœa dysentery &c. (Mr H. Z. Darrah Assam).

CHEMICAL COMPOSITION OF TABASHIR

The most complete analysis yet published is that of Prof T. Thomson of Glasgow (*Records of Gen. Science Feb 1836*) who found its constituents to be—in 100 parts Silica 90.50 Potash 1.10 Peroxide of Iron 0.90 Alumina 0.40 moisture 4.87 loss 2.23.

In addition to *tabashir* other parts of the bamboo are sometimes used medicinally. Kurz says The stiff fragile very fugaceous hairs or rather bristles on the sheaths of the shoots are used for poisoning. They are put in the meal or more usually in the coffee to be partaken and are said to cause death not suddenly but the action is very slow and the victim succumbs only after many months. (Kurz in *Indian Forester I 239*).

In addition to many other important uses, the bamboo is supposed to act as an emmenagogue a decoction of the leaves and shoots being

Bamboo
Sugar
85

Bamboo Sap
86

Poison
87

Decoction
88

BAMBUSEÆ**Domestic Uses****Splints**
89

used both in India and China to assist the lochial discharge after child birth

In places where ordinary surgical appliances are not available the leaf sheaths or carefully cleaned sections of stems may be used as splints. It is by no means an unusual thing to find a bamboo joint used as an artificial limb the stump of the leg being simply inserted at the open end of the bamboo

FOOD**FOOD**
The shoots
90

It has already been stated that in times of scarcity bamboo grain has saved the lives of thousands of human beings. This was the case in the Orissa famine of 1812. A similar event took place in Canara in 1864 when it was estimated that 50 000 persons came from Dharwar and Belgaum districts to collect the seed. In 1866 bamboo grain sold in Maldah at 13 seers to the rupee rice being 10. Many other instances are on record of the providential flowering of the bamboo having saved the lives of starving people but while this is so it is impossible to follow Mr Kurz and others who have advocated the extended cultivation of bamboo as a means of averting famine. Here we have says Kurz at once a key in dealing with the mitigation of famine in India. For this purpose he recommends the extended cultivation of *Bambusa arundinacea*, *B Tulda* and *B vulgaris*, suggesting the encouragement in these proposed famine relief plantations of tuberous wild plants such as *Dioscorea* (yams) *Tacca*, *Amorphophalus* (*Ol*) *Colocasia* (*Kuthu*) &c. He is of opinion that the extended cultivation of bamboo over wild tracts of country would increase the humidity and thus prevent the tanks and streams from being dried up. In this way a larger amount of fish might be produced. There cannot be a doubt but that cultivation in any form would greatly improve the condition of barren tracts of country and thus lessen the tendency to famine but there would seem to be no special claim in favour of the bamboo the more so since the crop of grain which occurs only after thirty years brings with it a plague of rats which injures the country for years after. Moreover when grain is plentiful the bamboo seed is not much eaten. It is a very unsafe aliment being apt to produce diarrhoea and dysentery (*Dr Bidie*)

The young shoots constitute a most important article of food all over India nearly every bamboo being eaten in this stage but the larver species are those most generally used. Freed from the sheaths and hairs they are cut up into small pieces and eaten in curries. They are also pickled or made into preserves. The very young shoots of the smaller species if boiled in water with a little salt resemble an inferior quality of asparagus.

They are eaten in Assam with great relish (*Mr H Z Darrah Assam*)

TIMBER**TIMBER**
91

Bamboos form the most important portion of the minor forest produce of all forest divisions and one that increases in value every year (*Atkinson*). It would occupy a volume even to enumerate by name all the uses to which the mature bamboo stems are put. Suffice it to say that to the inhabitants of the regions where the bamboo luxuriates it affords all the materials required for the erection and furnishing of the ordinary dwelling house. Certain species are more serviceable for posts and others are more adapted for matting and basket work but with one or two species every requirement may be met. For the construction of the mats of which the walls of huts are made *B Tulda* is the species most frequently used, and a strip from the outer green layer of this stem forms at once a most convenient and useful rope to tie the parts of the house which require to be made fast. *B Balcooa*, on the other hand, having a

of Indian Bamboos.

BAMBUSEÆ

thicker and more durable shell is generally used for posts boat oars and masts and all other purposes requiring greater strength and durability *Dendrocalamus strictus* and one or two allied species of male bamboos are those resorted to for walking sticks and spear shafts good solid bamboos being for these purposes in considerable demand

DOMESTIC USES

Every person in India is familiar with the simple yet clever way in which the bamboo is cut up and split into bands of every size or thickness so as to allow of its being used in the manufacture of mats of any degree of quality from the exceedingly fine mats made at Midnapur in Bengal to the ordinary coarse mat extensively used in house building. Thin strips of bamboo tied with strings are made into elegant door *tatties* (or curtains). Hollow bamboos are beaten here and there and cut at the nodes lengthwise and thereafter opened out and flattened into slabs which may be used for the seats of chairs tops of tables beds or other articles of furniture. In fact everything necessary for the erection and furnishing of a comfortable house can be obtained from the bamboo. The large Karen houses each of which constitutes a village by itself and which is large enough to contain as many as 200 to 300 persons are entirely constructed of bamboo. Fishermen frequently build bamboo houses over the rivers. The greater part of the people in Eastern India and the Malay live entirely in bamboo houses. Bamboo bridges are frequent all over India. A complicated mass of uprights in all directions supports a path way consisting of bamboo mats covered with a sprinkling of earth and resting upon a few horizontal bamboos attached to the uprights. To the new comer bridges of this nature seem most insecure but if in good condition they may be ridden over with perfect safety.

The larger hollow species are well suited for aqueducts water pails pots cups and other vessels. Pieces of thick bamboos from three to six feet in length with the partitions perforated so as to form long pails are carried by hill watermen suspended over the back by a bamboo string passing across the forehead instead of the water skin used by the *bhants* of the plains. From these long tubes the water escapes with a gurgling noise but it may be carried for days without either getting warm or being in any way spoiled. A single joint of a green bamboo is frequently used as a cooking pot the rice and water being placed inside and the mouth covered up. This primitive pot is placed on the fire until the rice is cooked. Spoons and knives are meanwhile being cut by the cook from the nearest bamboo clump. A simple ladle is made by cutting down to a handle the upper portion of a joint leaving about 2 or 3 inches of the bottom as a large spoon or ladle. By the aid of this ladle the food when cooked is divided and by means of the knife made of the hard outer portion of the stem fish or other animal food may be cut up. In fact every domestic appliance may be made of bamboo including the pail used in milking the cows and the churn with which the butter is prepared. In the Nagá country a section of a bamboo is used for stamping out circular rice-biscuits required in certain religious observances. All sorts of agricultural implements are also made of the bamboo and the appliances for spinning cotton and wool and also for reeling silk are often constructed entirely of the same material.

The fisherman makes his oars masts fishing appliances baskets and even his hooks of bamboo. One of the most curious hooks perhaps in the world is the one in common use in Bengal and Assam. This consists of a short piece of well seasoned bamboo, say 3 inches in length and $\frac{1}{4}$ of an inch in thickness. The string is attached to the middle of the twig, which is then bent into the shape of the letter U. The bait

TIMBER.

DOMESTIC
Fine Mats

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Common Mats

93

Bamboo

String

94

Domestic and
Agricultural
Vessels

95

Spoons and
Knives

96

Ladles.

97

Agricultural
implements

98

Industrial
Appliances

99

Fishing
Appliances

100

Traps

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Hooks.

102

BAMBUSEÆ**Domestic Uses****Harpoons
103**

generally used is the common green grasshopper the head of which is plucked off and rejected. The two points of the bent bamboo twig are now inserted into the open end of the body and the baited hook dropped into the water. The upper end of the string is attached to a small piece of bamboo about a foot in length and left floating in the water with the baited hook suspended. The fisherman from his dug out drops these lines in likely positions and rows himself about from one to the other. When the fish cuts the bait the hook jumps open in its mouth the extremities getting amongst its gills. Large fish are often caught in this way the pain and inconvenience of the hook apparently preventing the fish from offering the resistance which would at once set it at liberty. The common and characteristic harpoon of Bengal consists of a piece of *Dendrocalamus strictus* about 6 feet long cut into 8 or 10 long pieces about as thick as the little finger. These are smoothed and rounded up to within a foot of the top where the bamboo is firmly bound with string or wire to prevent its splitting further. The point of each of these portions is armed with a metal pointed cap. The fisherman rattling this instrument against the side of the dug out alarms the large fish from their hiding places amongst the weeds and no sooner is a fish visible than with great adroitness the harpoon is thrown and the prongs spreading out as it enters the water so large a space is covered as to leave the fish but a poor chance of escape if once the fisherman has been allowed to come sufficiently near.

Fishing rods**104****Spear shafts****105****Walking sticks****106****Bows and****Arrows****107****Poles****108****Articles of****Warfare****Spears****109**

All sorts of ingenious contrivances are made for catching fish and in the majority of cases they are constructed from the bamboo. Perhaps none are more beautiful than the small and delicate basket traps which are placed here and there in walls of aquatic plants built artificially across portions of tanks. Excellent fishing rods are also made of the solid bamboo these are in universal use all over India. Jointed rods of European manufacture have not as yet found their way to India except in the hands of a few European anglers.

Although the bamboo is not suited for the construction of boats or canoes it is by no means unusual to find a raft composed of one or two large bamboos lashed together used by the fishermen on lakes. Timber is also largely floated down the rivers upon bamboo rafts.

Bamboo is extensively used for making spear shafts bows and arrows poles for carrying loads &c. The spiny bamboos were formerly planted in ditches around forts as a protection. The Nagas and other hill tribes use the hardened outer woody portion as knives and spears. The jungles and forests around villages are often covered for miles with these formidable weapons. Short sharp bamboo knives called *pangis* are buried amongst the leaves along the foot path in such a position as to go right through the foot of the unfortunate traveller. Often three of these are arranged two sloping forward and the other facing the traveller on his approaching the village. The foot is by accident placed between these and being cut by the one in front is rapidly withdrawn only to have the other two violently driven in from behind. Sometimes thousands of these *pangis* both visible and invisible cover the entire surface of the ground—so much so that the village is unapproachable to any person but the inhabitants who are familiar with every turning that has to be taken to escape this formidable bamboo defence. Pits are also dug the bottom of which is full of these knives pointing in every possible direction. The mouth of the pit is cleverly covered with leaves and the animal or man who places his foot upon this trap falls to a fearful and certain death. Crude scabbards are also made of the bamboo and handles for swords knives and axes.

Knives**110****Pangis****111****Musical Instruments****Fifes****112**

All sorts of curious musical instruments are made of the bamboo—from the fife to the crude violin with its two or three strings. The strings

of Indian Bamboos.

BAMBUSA
affinis

are prepared from the green outer layer of the stem carefully cut and when tightened give out a dull musical tone. In Manipur and the Nagá country the hill tribes prepare an exceedingly curious jew's harp from the bamboo. This consists of a thin piece of bamboo not unlike the common musical pitchfork in size and shape only that it has three instead of two arms and is not more than $\frac{1}{4}$ of an inch in thickness. This is placed in the mouth just as with the jew's harp and a monotonous music is produced (*Mr McCabe Deputy Commissioner Naga Hills*). Perhaps the most amusing musical contrivance is the bamboo Æolian harp made in the Malay Peninsula. The bamboos in a village clump or far away in the jungles are perforated here and there in such a way as to keep whistling in all tones at once as the wind blows through the culms. The sound produced in this way has been described as at times soft and liquid like the notes of a flute and again deep and full like that of the organ. A kind of very curious whistle is used by the Chinese for driving away evil spirits &c. Several holes are pierced in a piece of bamboo two of the natural knots being left one of which offers an opening out in a slope to each extremity are fastened two long strips of paper from 15 to 18 feet in length and 6 to 8 inches wide. A string is attached to a groove made in the bamboo and when there is a little wind this curious kite is sent aloft remaining in the air as long as the wind is strong enough to keep it up. In this position a monotonous whistling is produced resembling at times the noise of a jet of steam or the sighing of the wind in trees.

The *auklong* of the Malays is a very agreeable instrument. It consists of a number of hollow bamboo-joints of various but selected length and thickness which are cut out below and hang down from a bamboo frame. These give various swinging tones and strength according to their size on being beaten with a bamboo staff. On the occasion of festivities such as a marriage circumcision &c. Malays greatly use the green halms of bamboo (especially the larger sorts) and have them put in specially prepared fires. The air enclosed in the joints gets heated and the joints burst with a heavy report which varies in strength from that of a pistol to that of a small gun according to the sort of bamboo used smaller halms being usually added which keep up a continuous rattling and crackling noise (*The Indian Forester Vol I pp 234 35*).

BAMBUSA, Schreb Gen Pl III, 1210

II16

A genus of large bamboos growing in clumps or clusters comprising some 24 species

Erect arborescent rarely scandent plants. Leaves shortly petiole but with a large articulate sheath. Flowers in a few species occurring on leaf bearing stems generally on leafless short stems a few of which appear and die every year or the entire clump reaches maturity at once and after flowering dies. It often happens that the bamboos of an entire district flower and die at once followed by a dense mass of seedlings this is especially true of *B arundinacea*. Spikelets 2 many flowered generally sessile interrupted. Inferior glumes 3 4 empty. Palea 2 keeled distinctly ciliate or winged. Stamens 6 free. Style deciduous deeply 2 3 hd. Caryopsis small wheat like with a membranous pericarp closely adnate to the seed.

The generic name *Bambusa* is a Latinised form of the Mahratta name Bambu.

Bambusa affinis, Munro, 93 GRAMINEÆ

II17

Vern.—*Theeshe thaskwa* BURM

Habitat.—Found in Martaban, and said by Munro to be scandent by Kurz to be a small tufted species attaining a height of from 15 to 20 feet

B II17

Violins
II13
Violin strings
II14
Jew's harp
II15

**BAMBUSA
arundinacea****The Spiny Bamboo of Western India**

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Bambusa arundinacea, Retz**THE SPINY BAMBOO OF CENTRAL, SOUTH, AND WEST INDIA****Syn**—**B** ORIENTALIS Nees **ARUNDO BAMBUS** Linn **BAMBUS ARUN**
DINACEA Pers**Vern**—**Báns** kattang magar báns nal báns HIND **Bans** behúr báns
BENG **Bndh** ASS **Katanga** KOL **Mat** SANTALI **Wah kanteh**,
GARO **Bariala** CHITTAGONG **Magar nól** PB **Wans** GUJ **Kalak**
padai KONKAN (THANA) **Vas** PANCH MAHALS **Mandgay** BOMB
Bháns chánsa (if small) **bambu** (if large) DUK **Kati wadúr** GOND
Vansa kichaka SANS **Qasab** ARAB **Nai** PERS **Mangal** TAM
Mulkas kanka (Upper Godavari District) **bóngá veduru** bongá veduru,
pente veduru (Madras) TEL **Bidungulu** KAN **Wa nah** MAGH
Kyakatwa BURM **Kattu-una** una SINGH§ In towns all kinds of Bamboos are called *kallak* in Marathi (*Dr Dymock*)**Habitat**—A common bamboo in Central and South India and Burma
Cultivated in many places in North West India and in Bengal**Botanic Diagnosis**—Stems tall green spinescent growing in clumps
of 30 to 100 each attaining a height of from 30 to 50 feet walls of the
culm thick cavity small lower branches spreading spines strong sharp
curved either in pairs at the base of a branch or in threes the middle one
the largest **Leaves** small thin lanceolate 4.8 inches long and $\frac{1}{2}$ to $\frac{3}{4}$
broad generally glabrous but sometimes with scattered hairs underneath
nerves 5 to 6 on either side of the midrib **spikelets** mostly sessile in dense
half whorled clusters **Flowering glume** thickened and mucronate at the
apex glabrous not ciliate at the edges **Ovary** glabrous style deeply 2
or 3 fid **Flowering** appears to take place after long intervals probably
at the age of 30 years (*Brandis*) On this subject **Mr Duthie** writes
'The simultaneous flowering and subsequent dying of almost every
individual plant of this species in certain districts and at certain stated
times has been an interesting subject for observation There seems to be
no particular age at which the flowering takes place the event is prob-
ably to a great extent influenced by the nature of the season (For
further information regarding the flowering of this and other species see
under **Bamboo**)By the older writers on Indian economic products the properties of the
Bamboos as a whole seem to have been referred to this species and it is
accordingly difficult to separate some of the popular botanical and verna-
cular synonyms The following remarks under the heading of **Medicine**
may be understood to belong to more than one species and might not in
correctly be referred to the peculiar species met with in each district in
India —**Properties and Uses—****MEDICINE**

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Surgical

Appliances

120

Medicine— In addition to the many important uses to which the
Bamboo is applied in tropical life it forms by no means an insignificant
article of the Indian Materia Medica Its supposed virtues are set forth
at length in the *Taleef Shereef* (Art *Bans* p 28 No 114) A belief in
the emmenagogue properties of the leaves is common alike in India and
China but neither in this nor in any other character does it appear
worthy of attention as a medicine In positions where ordinary surgical
appliances are not at hand it is well to bear in mind that with very little
manipulation splints of any required length or size can be obtained with
little delay from the stems of the bamboo For this purpose the older
drier stems are to be preferred the younger yielding somewhat on pres-
sure. (*Pharmacopœia of India* pp 256-7) It is by no means unusual
to find a joint of the bamboo being used in India as an artificial limb
the stump being simply inserted into the open end of the bamboo

Female Bamboo

BAMBUSA
Brandisii

§ The tender leaves of this plant are used with black pepper and common salt to check diarrhoea in cattle (*Brigade Surgeon F H Thornton B A M B Monghyr*) The most efficacious application for dislodgement of worms in ulcers is a poultice made by pounding the young shoots of the bamboo The juice is first poured on the vermin and the ligneous mass is applied and secured by a bandage (*Honorary Surgeon P Kinsley Chicacole Ganjam District Madras Presidency*) The leaf bud is used in the shape of a decoction to encourage the free discharge of the menses or lochia when this is scanty (*Native Surgeon Ruthnam Moodelliar Chingleput Madras Presidency*) Is used in leprosy fevers and hæmoptysis (*Surgeon Major D R Thompson M D Madras*)

A silicious concretion known most frequently under the Persian name *Tabashir* is obtained chiefly from the interior of the stems of this species It is much used by the natives as a drug (See under **Bamboo**)

Food—The seed resembles unhusked rice and is eaten by the poorer classes like that cereal As it appears at the very season when drought occurs and other crops have generally failed it is of some advantage to the poor The young shoots are cut when tender and eaten like asparagus This remark applies to nearly every species of bamboo the young shoots being known as *bans ka kullu*

Fodder—The leaves and twigs form an important fodder this species being largely consumed by elephants

Timber—This bamboo is of good quality and strong and is used for all purposes

Domestic and Sacred Uses—This and other species of bamboo are frequently represented upon Buddhistic sculptures The stems are used very extensively for domestic purposes (See under **Bamboo**)

Bambusa baccifera, Roxb *Fl Ind Ed C B C*, 305 **Syn** for *Melocanna bambusoides* which see

B Balcooa, Roxb *Fl Ind Ed C B C* 305

Sometimes called THE FEMALE BAMBOO

Vern—*Balku* BENG *Betwa* CACHAR *Bhaluka* ASS and CACHAR *Bling* LEPCHA

References—*Munro Linn Soc Trans XXXVI* 100 *Brandis For Fl* 567 *Voigt's Hort Suburb Calc* 718 *Gamble Man Timb* 428

Habitat—A native of the plains of the eastern side of India extending from Bengal into Assam and Cachar This is the large and characteristic bamboo of the villages of Bengal **Dr Brandis** thinks that the bamboo below Simla ascending to 5500 feet may belong to this species

Botanic Diagnosis—Differs chiefly from **B Tulda** in its larger leaves not pubescent and possessed of distinct transverse veins Scales ovate or obovate with distinct longitudinal nerves The spikelets are also only $\frac{1}{2}$ to $\frac{1}{2}$ inch long and the joints of the rachis short and glabrous.

Timber—A bamboo with stems often 50 to 70 feet in height stouter and taller than in **B Tulda** This is the best Bengal species for building scaffolding and other works which require both size and strength Long immersion in water tends to make it firmer and proof against the attacks of Bostrichi (*Roxb*)

Bambusa Brandisii, Munro 109

Syn—*DENDROCALAMUS BRANDISII Kunt II* 560

Vern—*Ora* BENG ; *Turgu-wah* MAGH *Keyllowa wabo*, BURM

Habitat.—A gigantic species met with in Chittagong and Burma up to 4,000 feet

MEDICINE
Leaves
121
Poultice of
shoots
122
Leaf bud
123

FOOD
Grain
124
Shoots
125

FODDER
126
TIMBER
127
DOMESTIC
128

129

TIMBER
130

**BAMBUSA
polymorpha****Indian Bamboos.**

- TIMBER 131** **Botanic Diagnosis** — Young shoots with adpressed tawny hairs auricles waved decurrent fringed inside ligule narrow Angle of the inner palea minutely ciliate (*Kurz*)
Timber — Stems often become 126 feet high and 30 inches in circumference
- Bambusa Falconeri, Munro, 95 Brandis For Fl, 568**
Vern — *Chye kag*
- TIMBER 132** **Habitat** — Found in the North West Himálaya
Botanic Diagnosis — The final identification of the large bamboo at the foot of the North West Himálaya is a subject still very obscure (See note under **B Balcooa**) The present species was described from a flowering specimen collected by the late **Dr Falconer** in Dehra Dun Spikelets lanceolate wholly glabrous nearly 1 inch long and about 10-flowered Flowering glumes mucronate with numerous broad prominent nerves somewhat like those of **B Tulda** (*Brandis*)
- TIMBER 133** **B khasiana, Munro Munro 97**
Vern — *Tumar KHASIA*
Habitat — Met with in the Khásia Hills
- B nana, Roxb Gen Pl, III 1211**
Vern — *Pilawpmanwa BURM*
Habitat — *Kurz* says of this species that it is rarely cultivated in and around Rangoon
- TIMBER 134** **Botanic Diagnosis** — Young shoots with the sheaths not or only obscurely auricled at the mouth A small bamboo with small leaves whitish beneath
- B nutans, Wall Munro 92 Brandis For Fl 567**
Vern — *Nal bány BENG Mahlbans NEPAL Mahlu LEFCHA Yüshing BHUTIA Biduli mukial ASS Pichle SYLHET*
Habitat — A most beautiful species largely planted near villages in Nepal Sikkim Khásia Hills Assam Sylhet and Bhután ascending to from 5 000 to 7 000 feet
Botanic Diagnosis — Closely allied to **B Tulda** the leaves being of medium size and with soft pubescence beneath Spicules long with elongated articulated and clavate joints to the rachis
- TIMBER 135** **Timber** — It is a small species with almost solid stems (*Munro*) The culm is of large diameter with a broad hollow part, but the wood is hard (*Gamble Trees and Shrubs of Darjiling*)
- 136** **B orientalis, Nees Beddome Flor Sylv t cxxxxi**
Habitat — A bamboo met with in South India
- 137** **B pallida, Munro**
Vern. — *Burwal bakhal CACHAR Usken KHASIA*
Habitat — A bamboo with stems about 50 feet long met with in Eastern Bengal and Assam
- 138** **B polymorpha, Munro Kurz, ii 553**
Vern — *Kya-thoungwa or kyathaungwa BURM*
Habitat. — Common in the upper mixed forests of the Pegu Yoma and Martaban
- B 138**

| The Common Bamboo of Bengal | BAMBUSA Tulda |
|---|--------------------------|
| <p>Botanic Diagnosis—An unarmed bamboo with large strongly fringed auricles with the sheaths of the young shoots green and yellow adpressed bristles white Anthers purple Stigma white Inner palea with the angles quite smooth (<i>Kurz</i>)</p> | |
| <p>Bambusa spinosa, Roxb <i>Fl Ind Ed C B C</i> 305 THE SPINY BAMBOO OF EASTERN INDIA</p> | 139 |
| <p>Syn.—Dr Brandis and also Dr Kurz regard this merely as a form of <i>B arundinacea</i> peculiar to the eastern side of India they can find no characters to separate these spiny bamboos Dr Roxburgh treats them as quite distinct species In this opinion he is supported by General Munro who distinguishes the two plants giving the characters which will be found below for <i>B spinosa</i> Vern—<i>Bur behar bāns</i> HIND (<i>Duthie</i>) <i>Behor</i> BENG <i>Koto Ass</i> Kinkoi CACHAR <i>Yakatwa</i> BURM</p> | |
| <p>Habitat—A native of Bengal Assam and Burma also of the north eastern division of the Madras Presidency Cultivated in the North West Provinces and other parts of India Botanic Diagnosis—A paler coloured and more striated panicle smaller and more coriaceous spicula with fewer flowers generally smaller leaves which are often hairy on the under side and with the petiole sometimes remarkably swollen at the base (<i>Munro in Trans Linn Soc XXVI 105</i>)</p> | |
| <p>Timber—This beautiful middling sized very elegant species I have only found in the vicinity of Calcutta where now and then some of the oldest are found to blossom about the beginning of the rains in June Like the other species this is employed for various useful purposes and as it grows to a pretty large size and with a smaller cavity than any of the others it is strong and well adapted for a variety of uses (<i>Roxb F Ind Ed C B C</i> 306)</p> | TIMBER 140 |
| <p>B teres, Ham A native of Bengal and Assam</p> | 141 |
| <p>B Thouarsii, Kth ; Syn for <i>B vulgaris, Wendl</i> which see.</p> | |
| <p>B Tulda, Roxb <i>Fl Ind Ed C B C</i>, 304 THE COMMON BAMBOO OF BENGAL</p> | 142 |
| <p>Vern—<i>Peka</i> HIND <i>Tulda jowa mitenga matela dyowa bāns</i> BENG ; <i>Māk</i> SANTAL <i>Pepesiman</i> KOL <i>Makor</i> MAL (S P) <i>Wahghi</i> GARO <i>Madaewah</i> MAGH <i>Therwa thoukwa</i> or <i>thakwa</i> BURM References—Brandis <i>For Fl</i> 566 <i>Munro Trans Linn Soc XXVI 91 Kurz For Fl Brit Burm II 552 Gamble Man Timb 427 Voigt Hort Suburb Calc 718</i></p> | |
| <p>Habitat.—This is the common Bamboo of Bengal where it grows in great abundance everywhere flowering in May Not uncommon in the deciduous forests of Pegu generally occupying lower and moister stretches of ground in company with <i>tinwa</i> (<i>Cephalostachyum pergracile, Munro</i>) the dry hills surrounding being covered with <i>Dendrocalamus strictus</i> (<i>Brandis</i>)</p> | |
| <p>Botanic Diagnosis—Leaves middle sized pale and soft pubescent beneath transverse veins none <i>Spikelets</i> terete 1 2 inches long joints of rachis elongated thickened into a hairy disc under the flowering glume scales cuneate thickened at the base but without prominent nerves</p> | |
| <p>Fibre—Largely used for mats baskets, fans, and window blinds This is in fact one of the most useful plants in Bengal</p> | FIBRE Mats &c. 143 |
| <p>B 143</p> | |

BARILLA

Reh Efflorescence

FOOD
Shoots144
TIMBER
145Jowa bans
146Basini bans
147
Behur bans
148

Food—The young shoots are pickled when only about 2 feet high they are tender (*Roxb*)

Structure of the Wood—The wood is strong and the halms are used for roofing scaffolding mats and other purposes (*Gamble*) Found more durable if soaked in water previous to being used This is regarded in Bengal as one of the best quality of bamboos Both *Roxburgh* and *Voigt* mention several varieties The following extract will be found to give the more important forms *Jowa bans* (*pra bansh*?) of the Bengalis is only a large variety of this species and used chiefly for scaffolding and building the larger and better sorts of houses of the natives it differs from *Tulda* proper in the greater length and thickness of the joints *Basini bans* of the Bengalis is another variety of *Tulda* It has a larger cavity and is used chiefly to make baskets *Behoor bans* is of a small size very solid and strong much bent to one side and armed with numerous strong thorns which renders it very fit for hedges A staff of this species must be placed in the hand of every young Brahmin when invested with the sacerdotal cord otherwise they say the ceremony cannot be performed (*Roxb Fl Ind Ed C B C 305*)

149

Bambusa vulgaris, Wendl

THE YELLOW AND GREEN STRIPED BAMBOO

Syn—B THOUARSII *Kunth* B VULGARIS *Schrad* B ARUNDINACEA *Aiton*

Vern—*Kallak vansa kalaka* BOMB *Basini bans* BENG *Una Singh*

References—*Brandis For Fl 568 Thwaites En Ceylon Pl 375 Dals and Gbs Bomb Fl 299 Munro 106 Beddome Fl Sylva CCXXXII Gamble Man Timb 428 Lisboa Bomb Pl 137*

Habitat—Cultivated throughout India said to be a native of the southern and central parts of Ceylon It is also supposed to be a native of Sylhet and Chittagong is naturalised in the West Indies and cultivated in South America

Botanic Diagnosis—Leaves with distinct transverse veins Spikelets laterally compressed flowers distichous Empty glumes 2 flowering glumes ovate-lanceolate narrowed at the base longitudinal veins prominent near the apex indistinct below mucronate and ciliate at the apex fimbriate keels of palea conspicuous near the top of the flowering glume Anthers penicillate at the apex with short hairs style slender filiform 2 3 fid at the end

TIMBER
150

Timber—Stems 20 to 50 feet yellow or striped yellow and green Joints 4 inches in diameter and more with thin walls

Much used by Cinghalese for temporary buildings and other purposes The flowers which are very rarely produced very much resemble those of the next species (*B arundinacea*), but their outer palæ are somewhat longer and terminate in subulate points' (*Thw En Ceylon Pl 375*)

Banana, or Plantain, see Musa.

Barberry, see Berberis vulgaris, Linn BERBERIDÆ

BARILLA.

151

Barilla (a crude carbonate of soda) is in India obtained from two sources (a) as an efflorescence on the soil, and (b) from the ashes of certain salt worts or plants containing sodium

The former is scarcely known in Europe and should receive the name *sajjé mátté* while the carbonate of soda obtained from plants is, strictly speaking the barilla of commerce or the *khár sajjé* of Indian bazars

B 151

of Sodium Carbonate

BARILLA.

CARBONATE OF SODA OBTAINED AS AN EFFLORESCENCE

(a) *Sajji* and *Sajji máti* —The efflorescence known as *reh* is exceedingly abundant in India occurring over many large tracts of country often rendering the soil quite sterile. This has within recent years received the most careful attention both of the Agricultural Departments and of the Geological Survey. Under *Reh* this subject will be dealt with at greater detail and it is necessary here to refer to it only in so far as it is connected with the subject of *sajji* or barilla. The decomposition of rocks through the action of the atmospheric oxygen and carbonic acid gives origin ultimately to soluble sulphates carbonates and chlorides. These are carried away by the rivers. In the fresh water alluvial plains of India such salts have accumulated during the lapse of centuries to an extent sufficient to give origin by chemical changes in the soil to the so-called *reh* efflorescence the heat of the sun drawing the ultimate salts to the surface. In an interesting report on this subject published by Dr W. Center, Panjab Chemical Examiner, the process of capillary attraction or the drawing of the salts to the surface in the form of an efflorescence is carefully gone into. These salts however are not deposited as they exist in solution as new laws come into play. The chief of these is that during evaporation the least soluble salt that can be formed is first deposited but this is modified by two other laws —the tendency of certain compounds to form double salts and the tendency of substances with the same crystalline form to crystallize out together. The efflorescences thus produced consist of three groups: 1st the neutral which contain no carbonate of soda (these consist chiefly of sodium chloride and sulphate and frequently magnesium sulphate) 2nd the alkaline which contain carbonate of soda and alkaline chlorides and sulphates but no lime or magnesian salts 3rd, the nitrous efflorescences. These generally contain no alkaline carbonate but consist chiefly of nitrate of lime and alkaline chlorides. Others contain alkaline nitrate chloride and sulphate. They are developed where the soil has become loaded with organic nitrogenous matter.

Reh is thus not a special salt or mixture of salts but a very variable compound. It is really the most easily soluble salt in the earth water remaining in solution after the deposition of carbonate of lime &c on evaporation. The ingredients and their relative proportions are found to vary in different places exactly as the well waters at different spots differ in saline contents and in the same area there is a close relation between the two.

Mr. Medlicott, Superintendent of the Geological Survey (*Records of the Survey Vol. XIII* 273) has also contributed greatly to our knowledge of *usar* (sterile) and *kalar* (saline) lands and has thrown much light on the explanation of *reh* efflorescences. He has shown that the relative proportion of common salt to sodium sulphate varies from 4 to 24 per cent. In one district one salt predominates in another a second is more abundant. Common soda (carbonate of soda—*sajji*) is sometimes present and such earths are locally used by the washermen in place of soap. This is however a much less frequent *reh* efflorescence than sodium sulphate but it seems likely that the so-called *sajji máti* of our Indian bazars is a specially selected *reh* containing as its principal ingredient carbonate of soda. *Sajji* strictly speaking, means pure carbonate of soda.

Occurrence of *Sajji-máti* —In Bengal *sajji máti* is said to be found in Behar north of the Ganges at Patna. O'Shaughnessy mentions that it exists in great abundance in the neighbourhood of Monghyr. In a recent correspondence conducted by the Government of India, Revenue and Agricultural Department, and at the instance of Sir J. D. Hooker, the

SAJJI MATI.
152BENGAL
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| BARILLA | Barilla or Sajji Khár |
|--------------------------------|--|
| SAJJI MATI MADRAS 154 | Commissioner of Salt Revenue Madras reports As soils containing a large percentage (from 30 to 50 per cent.) of carbonate of soda abound all over the country and are habitually collected by the people for use as <i>dhobies</i> earth and in dyeing and for the manufacture of soap and of glass bangles I see no advantage in undertaking the manufacture of barilla from alkaline plants This efflorescence referred to is common in Mysore and Travancore and a small internal trade exists in conveying it to the town of Madras It is purified by a simple process of lixiviation This same practice prevails in some parts of the North West Provinces where <i>sajji mati</i> occurs it is said to be prepared at Ghazipur In the correspondence referred to it is stated that the Lucknow Paper mills have at the suggestion of the Agricultural Department commenced to manufacture their own caustic soda from the <i>reh</i> earth By this improvement they have effected an annual saving of ₹11 000 they have at the same time abandoned the importation of European caustic soda In the Panjáb <i>sajji mati</i> is said (<i>Official Correspondence</i>) to be prepared at Multan Gugaria Jhang and Shahpur (<i>sajji khar</i> ?) In Bombay <i>sajji mati</i> or carbonate of soda efflorescences is met with The Collector of Ahmedabad reports that barilla is not manufactured from plants in his district but that the efflorescence known as <i>oos</i> or <i>khár</i> is used in washing clothes and also in the manufacture of soap and glass it is worth about an anna per basket In the Northern Division of Bombay this <i>oos</i> efflorescence is said to cover a large area of land it is used extensively for soap and glass making Both the Paper mills and the Soap manufacturing Company of Bombay import however their caustic soda from England having found the locally prepared article more expensive |
| N W P 155 | Chemistry of Sajji mati —Speaking of sodium efflorescences Mr. Medicott (<i>Official Correspondence</i>) says The direct derivation of soda from the <i>reh</i> salts would no doubt be an easy process (for a chemical manufacture) sometimes soda forms a principal constituent of the <i>reh</i> and it is then freely utilised by the <i>dhobies</i> but the commonest constituent of the <i>reh</i> is sodic sulphate which is the first result in the process of soda manufacture by the treatment of common salt with sulphuric acid Thus the most expensive part of the process would be saved and the further conversion of sodic sulphate into sodic carbonate (soda) by the action of lime and fuel is simple Mr. Pedler Professor of Chemistry Calcutta says that the samples of <i>sajji mati</i> which he has examined have consisted mainly of carbonate of soda He adds As a commercial article I believe <i>sajji mati</i> is usually more valuable than the barilla obtained from Spain for while barilla rarely contains more than 25 or 30 per cent of carbonate of soda <i>sajji mati</i> is known sometimes to contain as much as 50 per cent of that substance (<i>Official Correspondence</i> December 15th 1884 No 3816) |
| PANJAB 156 | CARBONATE OF SODA OBTAINED FROM THE ASH OF CERTAIN PLANTS—BARILLA |
| BOMBAY 157 | (b) Khár sajji , or Sajji khár , or Barilla .—This is carbonate of soda obtained from the ashes (<i>khár</i>) of certain salt works This must not be confused with pearl ash or the form of potassium carbonate obtained from most other plants In the correspondence to which reference has already been made this mistake occurs, lists of pearl ash plants having been enumerated as those from which barilla is obtained The manufacture of barilla first assumed commercial importance in Spain and was an article of considerable value until Le Blanc discovered his method of preparing soda from common sea salt Since then it has considerably declined Before this important discovery the demand for barilla caused attention to be directed to India as a country to which the trade might possibly be |
| BARILLA. SAJJI KHAR 158 | |

| Barilla or Sajji khar | BARILLA. |
|--|---|
| <p>extended Roxburgh at the beginning of the century recommended the cultivation of one or two plants on the coast of Madras but there is no evidence of this having been acted upon</p> <p>Mr Baden Powell (in his <i>Panjab Products Vol I 86</i>) has given a most instructive account of barilla manufacture as practised in the Panjáb The process by which this substance is prepared is carried on during the month of October and the three following months The plant after being cut down is allowed to dry The next step is to dig a pit of a hemispherical shape about 6 feet in circumference and 3 feet deep One or more vessels with holes perforated are inverted and placed in the bottom of the pit the holes being kept closed when the operation begins The dry plants are gradually burned and during the process a liquid substance is found to run down into the inverted vessels After this has taken place the residue is stirred up by means of a flat piece of wood and kept covered over for three or four days till it cools Care must be taken not to allow water to get to the molten liquid otherwise the whole mass would blow up In the inverted vessels will be found a pure form of <i>khar sajji</i> and in the bottom of the pit an impure form containing a mixture of ashes This process differs only very slightly from that followed in Spain In the latter country the plants are burned on iron bars placed across the mouth of the pit and vessels to separate the substance into pure and impure barilla are not placed in the bottom</p> <p>In the correspondence to which repeated reference has already been made the Panjáb Government has supplied some interesting information regarding the present condition of the manufacture of barilla The industry exists only to a limited extent in Montgomery and Jhang and not at all in Jhelum Rawal Pindi Gujarát and Mozafergarh In Shahpur and Multan however the manufacture of <i>sajji</i> is considerable The Deputy Commissioner of Shahpur reports that the outturn is from eight to ten thousand maunds a year and the revenue derived by Government by the lease of <i>sajji</i> producing lands amounts at present to over Rs 500 per annum The price too from various causes has risen from Rs 2 to about Rs 10 per maund since 1865</p> <p>The income derived in the Multan district is also increasing and though not so high as it was ten years ago is higher this year than in any year since 1880 The Deputy Commissioner of Multan says that in his district the plants are cut in the months of January and February and not in October and November as stated in Baden Powell's Panjab Products He adds I can find no evidence that the introduction of soda salts manufactured by purely chemical processes has injuriously affected the trade in barilla He adds that the land on which barilla yielding plants grow was leased for 1883 84 and realised Rs 7 907 which is higher than that realised in any of the past ten years except 1875 76 1877 78, 1878 79 and 1879 80</p> <p>The Settlement Report of Shahpur district contains an interesting account of <i>sajji</i> manufacture The Deputy Commissioner says in reference to Colonel Davis report The account of <i>sajji</i> manufacture given by Colonel Davis in 1865 seems to contain all the information required, and this industry is now in about precisely the same condition as it was then As far as I have been able to ascertain the introduction of soda salts manufactured by purely chemical processes has not affected it at all injuriously On the contrary the price of <i>sajji</i> has lately risen to Rs 8 and Rs 12 per maund but this is said to be chiefly due to the fact that owing to recent droughts the growth of the plants has been less flourishing than formerly The sums realised from farming the monopoly of manufacturing this alkali amount still to upwards of Rs 8 000 The income under the head <i>sajji</i> last year was a little over Rs 9,500 The quantity of <i>sajji</i></p> | <p>SAJJI KHAR MADRAS 159</p> <p>PANJAB 160</p> |

BARILLA.

Sodium Carbonate

SAJJI KHAR.
PANJAB

manufactured in this district is said to be about 10 000 maunds, but the plant itself is also highly esteemed as a fodder for camels and the farmers of *sajji* do not allow camel owners to take the plant for fodder gratis

The following extracts from the Settlement Reports of Jhang and Montgomery might also be here given "*Caroxylon Griffithii* is the *khar* There is a considerable disagreement as to what plant or plants *sajji* is made from In the Jhang district *sajji* is made from *khar* only I have made repeated enquiries and have always received the same answer that *sajji* is made from *khar* but that sometimes as sugar is sanded and as a variety of jams are partly made from turnips and decayed figs so is the bulk of the *sajji* increased by burning *lana* with the *khar* I have been constantly in camp at the time the *khar* is cut but I have never seen a single bundle of cut *lana* and such adulteration is very uncommon All four plants are excellent grazing for camels

In Montgomery a good deal of misapprehension seems to exist about the *lana* plant There are three kinds of *lana* *Khangar khar* (*Caroxylon Griffithii*) *Gora lana* and *Methar lana* (*Salsola*) There is also a plant called *Phesak lan* (*Suaeda nudiflora*) *Sajji* (*barilla*) an impure carbonate of soda is made from the first two No *sajji* is made from the others The best *sajji* called *Lota sajji* is made from *Khangar khar* an inferior quality known as *Bhutni sajji* from *Gora lana* All four plants can be seen in the Montgomery civil station

SIND
161

In the same correspondence the Commissioner of Sind reports that there are no soda salts manufactured by purely chemical processes in Sind but that there is a substance called *khar* manufactured from a plant called *lan* which grows wild all over the province and springs up spontaneously after a copious fall of rain The *khar* or salt obtained from this plant is commonly used in Sind for dyeing washing and soap making purposes and in the manufacture of common glass The Commissioner gives the following account of the process adopted in manufacturing this salt from the *lan* plant which it will be observed is very similar to that pursued in Spain The *lan* plant is cut and gathered together in heaps A circular pit varying from one and a half to two or three feet in depth and diameter according to the convenience of the individual manufacturer and the quantity to be manufactured is then dug in a clean level piece of ground A fire is kindled near the pit and the freshly cut plant thrown on it The action of the fire causes the juice of the plant to exude and run into the pit Fresh quantities of the plant are thrown on the fire from time to time until the pit is almost filled with the liquid exudation The mass is then stirred with a pole for from two to three hours after which the pit is covered over and on the third day when the liquid has cooled down and solidified it is dug out and broken into pieces for use

Mr Erskine adds that the manufacture flourishes most near Kutchee in Khelat about 5 500 maunds of *khar* being annually imported into Jacob abad that the quantity manufactured in Shikarpur and in Thar and Parkar is roughly estimated at 5 550 maunds and 3 000 maunds respectively every year that the demand for the article has not been affected by the manufacture of soda salts by chemical processes and that its price varies between R1 and annas 8 a maund In another part of the same correspondence The Political Resident at Aden reports that *Salsola* (*Suaeda nudiflora*, vulgarly called Aden Balsam grows freely in the plain in the neighbourhood of Aden and that before the purchase of Sheikh Othman large quantities of the bush were wastefully burnt to produce salt but that the shrub is now preserved within British limits He observes that the bush seems to possess great vitality and fecundity, that it

ADEN
162

The Barleria

BARLERIA
cristata

is called by the Arabs *asl* and the barilla made therefrom is named *hotm* that the Indians style it indifferently *khar khâr saji* and *saji khâr* that the method of manufacture is primitive and resembles that described in the correspondence accompanying the letter from the Government of India except that iron rods are not placed over the holes wherein the plant is consumed and that advantage will be taken of the Spanish method in working the industry which it is proposed to do shortly under Government supervision. Major Hunter adds Soda salts manufactured by purely chemical processes are only imported into Aden to the extent of ten or twelve hundredweights per annum and do not affect the local manufacture in any way. In Aden barilla is produced in circular cakes having a diameter of about eighteen inches and a maximum thickness of eight inches. The value may be roughly quoted at from five to eight annas per 28 lbs. It is anticipated that a certain amount of profit will be gained by the Municipality to whom the bushes belong either by the manufacture of barilla under supervision or by the sale of the right to produce it.

The following are the Indian plants reported to yield Barilla —

- 1 *Anthrocnemum indicum*, Moq. COROMANDEL COAST
- 2 *Caroxylon foetidum* Moq. SIND AND PANJAB
- 3 " *Griffithii*, Moq. Regarded as one of the best plants in the PANJAB
- 4 *Salicornia brachiata*, Roxb. SUNDERBUNS AND COROMANDEL
- 5 *Salsola brachiata* Pall. AFGHANISTAN
- 6 *Kali, Willd.* SIND AND PANJAB
- 7 *Suaeda fruticosa*, Forsk. SIND AND PANJAB
- 8 " *indica* Moq. SUNDERBUNS AND COROMANDEL
- 9 " *nudiflora*, Moq. ADEN PONDICHERRY

For further particulars regarding the above plants consult their positions in this work.

It seems highly desirable that the distinction into *saji mâti* and *saji khâr* urged in the above remarks should be clearly observed in all future enquiries into this subject. Care should also be taken not to confuse with these Pearl ash the *khar* or *kshâra* so extensively prepared all over India (see *Alkaline Earths*). The former are crude salts of sodium the latter of potassium. Information regarding iodine yielding plants will be found under *Kelp*.

BARLERIA, Linn. Gen Pl, II 1091

164

A genus of under-shrubs or herbs (generally spiny) belonging to the Natural Order ACANTHACEÆ comprising some 60 species chiefly natives of the old world—26 occurring in India.

Leaves opposite entire *Flowers* showy purple blue yellow or white sessile solitary or in dense or sub-lax spikes *Sepals* 4 in opposite pairs outer pair very much the larger anterior often emarginate bifid or deeply 2 lobed *Corolla tube* elongated sometimes very long funnel-shaped upwards lobes 5 sub-equal ovate or elliptic imbricate in bud *Stamens* 5 2 having oblong 2-celled anthers and 2 small rudimentary or rarely with a few grains of pollen an abortive 5th sometimes present. *Disc* large *Ovary* 4-ovulate *style* long shortly bifid or sub-entire *Capsule* ovoid or oblong 2-or 4 seeded below the middle.

The generic name is in honour of a Dominican traveller, the Rev J Barrelier, M D

Barleria cristata, Linn. Fl Br Ind, IV, 488

165

Syn — B *DICHOTOMA* Roxb. Fl Ind., Ed CBC 471; B *CRISTATA*, Willd. in Roxb. Fl Ind. Wight, Icon., t 453

B 165

BARILLA
YIELDING
PLANTS
163

**BARLERIA
prionitis.****The Barleria.**

Vern—*Jhanti* and *sada-jati* BENG *Jhinli* ASS *Tadrelu* (Bazar name *bansa siyah*) PB *Gorp jiba kala bansa* N W P, *Kotleka* URIYA *Jhinti* SANS

Habitat—A small elegant shrub, often met with in gardens and found wild on the sub tropical Himálaya Sikkim Khásia Hills the mountains of Burma, of Central India and of Madras, at an altitude of 4 000 feet Distributed to the Malaya and China

Properties and Uses—

Medicine—The seeds are supposed to be an antidote for snake-bite and the roots and leaves are used to reduce swellings and an infusion is given in coughs (*Madden Stewart Atkinson &c*)

MEDICINE

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Seeds

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Roots and

Leaves

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Barleria longiflora, Linn f Fl Br Ind IV 485

Syn—B LONGIFLORA Willd in Roxb Fl Ind Ed C B C 471 of Nees in Wall Pl As Rar 111 93, and in DC Prod XI 235 B LONGI FOLIA T Anders Should not be confused with BARLFRIA LONGIFOLIA Linn Amén Acad IV 320 or with RUELLIA LONGIFOLIA Roxb Fl Ind Ed C B C 475 which is HYGROPHILA SPINOSA T Anders This mistake has been made by Murray in Plants and Drugs of Sind and by other authors

169

Habitat—A small unarmed shrub, met with in the South Deccan Peninsula

170

B montana, Nees Fl Br Ind IV, 487

Vern—*Kolistá ikharí* BOMB

Habitat—A herbaceous species met with in the Deccan frequent in the Western Ghâts extends from Jubbulpore to Travancore

171

B prionitis, Linn Fl Br Ind IV 482

Syn—B PRIONITIS Willd in Roxb Fl Ind Ed C B C 470 Wight s Icon t 452 Dals & Gibs Bomb Fl 189

Vern—*Katsareya* HIND *Kantajati* BENG *Dasakarantod* URIYA *Kal sunda* or *kula sunda* *korhanti vajra danti* BOMB *Vajra danti* MAR *WAR Kanta shelio* GUJ *Piwala koranta* or *koreta* MAR *Lal phul ké kólse ka-patta* DUK *Vajra dani* CUTCH *Shemmuli varamulli* (?) TAM *Mulu goranta* TEL *Karuntaka vajradanti* SANS *Kattu kurandu* SINGH

Habitat—A small spiny bush with plentiful buff coloured flowers met with in tropical India abundant in Bombay, Madras Assam Sylhet and Ceylon Sometimes planted as a hedge

Properties and Uses—

Gum.—Referred to by Mr Baden Powell (*Panj Prod I 412*) as one of the beautiful dark red brown or black gums apparently contributed by Madras to the Panjáb Exhibition of 1864

§ The gum alluded to above by Mr Baden Powell is most probably a preparation from the juice When fresh it is yellow but afterwards turns black (*Surgeon Major W Dymock Bombay*) 'This plant is not known to yield any gum (*Assistant Surgeon Sakharam Arjun Ravat Bombay*)

GUM

172

MEDICINE

Juice

173

Medicine—Scarcely any new information has come to light since Dr Ainslie wrote— The juice of this leaf which is slightly bitter and rather pleasant to the taste is a favourite medicine of the Hindús of Lower India in the catarrhal affections of children which are accompanied with fever and much phlegm It is generally administered in a little honey or sugar and water in the quantity of two table spoonfuls twice daily Dr Dymock adds— The natives apply the juice of the leaves to their feet in the rainy season to harden them and thus prevent the laceration and cracking of the sole which would otherwise occur

B 173

The Indian Oak

BARRINGTONIA
acutangula.

Thwaites in his *Enumeration of Ceylon Plants* says this is employed as medicine by the Singhalese

§ The leaves are exhibited in syphilitic affections as an alterative (Surgeon Major W D Stewart Cuttack) Used in fevers and catarrhal affections" (Surgeon H W Hill Mánbhum) Useful in coughs and infantile diarrhoea (Surgeon Major D R Thompson M.D C I E Madras) Used as a diaphoretic and expectorant by natives. (Deputy Surgeon General George Bidie C I E Madras)

Leaves
174

Barleria strigosa, Willd *Fl Br Ind IV 489*

Syn.—B CÆRULEA Roxb *Fl Ind Ed CBC 471*

Vern.—Dasi BENG *Rasila baha* SANTAL Wahiti BOMB

Habitat.—Much cultivated in India but wild in the lower hills of Bengal up to an altitude of 4 000 feet in Orissa and Chutia Nagpur extending to the Western Ghâts (*var terminalis*) also in Sikkim and Assam

Medicine—The Rev A Oampbell, of Pachumbá Chutia Nagpur sends me a specimen of a *Barleria* which appears to be this species along with the following note This plant is called *Rasila baha* by the Santals and a preparation from the root is by them given in severe spasmodic coughs

175

MEDICINE.
Root
176

Barley, see *Hordeum vulgare*

BAROSMA, Willd *Gen Pl, I, 290***Barosma betulina**, Bart et Wendl, *RUTACEÆ*

THE BUCHU

Habitat—A native of South Africa the dried leaves are imported into India and sold by all chemists In addition to the above species the drug is obtained also from *B crenulata*, Hook *B serratifolia*, Willd

Medicine—It is aromatic stimulant and tonic chiefly used in disorders of the genito-urinary organs

177

MEDICINE
178

BARRINGTONIA, Forst *Gen Pl I 720*

A genus of trees belonging to the Natural Order MYRTACEÆ it contains some 20 species inhabitants of tropical Asia Africa Australia and Polynesia frequent near the sea

Leaves alternate often crowded near the extremities of the branches Flowers in terminal or lateral racemes or occasionally interrupted spikes Calyx tube scarcely produced above the ovary lobes 2 4 valvate or 3 5 imbricate Petals 4, rarely 5 much imbricate somewhat adnate to the base of the staminal tube Stamens many in several series connate into a tube at the base Ovary inferior 2 4-celled, crowded with an annular disc, style long simple stigma small ovules 2-8 in each cell pendulous Fruit fibrous or somewhat berried

The generic name is in honour of the English Antiquary the Hon Daines Barrington, FRS, it is the typical genus of the *Barringtoniaceæ*, sometimes called the ANCHOY PEAR FAMILY

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Barringtonia acutangula, Gærtn; *Fl Br Ind, II, 508*, MYRTACEÆ

Sometimes called INDIAN OAK

Vern.—*Iḍḍi, samundar-phal panniar ingar* HIND DUK *Ijar* MON GHYR *Hyal samundar* BENG *Nichula hyjala* SANS *Hinjol* SANTAL *Saprunḡ KOL; Kinyolo hinyara*, URIYA *Hendol* ASS *Kanapa* or *kanapa-chettu batta kuryā kadami* TEL *Hole kauva* KAN *Ingar yal samundar-phal tuwar* or *tuwara kanapachethi* (the fruit is known as *samudra phala* or *samandar-phal*) BOMB *Pwar*

180

BARRINGTONIA
racemosa**The Anchovy Pear Family**

tiwar newar niwar datto-phal MAR; *Samundra phula*, CUTCH
Nivar KONKAN, *Ellamidella* SINGH *Kyathha Kyéni kyéni kyéibeng*
BURM

Habitat—A moderate sized evergreen tree met with in the Sub-Himálayan tract from the Jumna eastward in Oudh Bengal Central and South India and Burma Distributed from Ceylon and Singapore to the Malaya and North West Australia One of the most plentiful trees in Bengal especially near the coast or beyond the tidal range Common in the swamp forests of Pegu and Tenasserim frequent in Kanára, Bombay along the banks of streams and in moist places

Properties and Uses—

Tan—The bark is used for tanning in Burma

Medicine—The LEAVES and the FRUIT are used in native medicine The ROOT is bitter and supposed to be similar to Cinchona in its properties It is also held to be cooling and aperient The SEEDS are warm and dry used as an aromatic in colic and in parturition also in ophthalmia (*Baden Powell*) *Samundar phal* is faintly aromatic and very bitter and is considered by the natives to be warm stimulating and emetic in Bombay it is often prescribed alone or in combination with other medicines as an external application in colds A few grains are often given as an emetic to children suffering from catarrh and seldom fail to induce vomiting (*Dymock Mut Med W Ind 266*) The fruit rubbed in water is administered as an emetic (*Lisboa Useful Pl Bomb*) The kernels powdered and prepared with sago and butter are said to be used in diarrhoea

Chemical Composition—The seeds according to **Dr Dymock** are about the size of a nutmeg They are easily softened by immersion in water The bulk of the seed consists of starch

Special Opinions—§ A few grains of the seed with the juice of fresh ginger are given to children as an expectorant and emetic It appears to be a very efficient remedy (*Surgeon Major W Dymock Bombay*)

The juice of the leaves is given in diarrhoea The powdered seeds are used as snuff in headache (*Civil Medical Officer U C Dutt Serampore*) The powdered fruit is an ingredient along with *mal kangoni* (*Celastrus*) in a cosmetic it is rubbed on the skin in cases of fever attended with nervous symptoms Mixed with dry ginger it is also rubbed on the skin to check profuse sweating (*Assistant Surgeon Sakharam Arjun Rávat L M Girgaum Bombay*)

Poison—The bark is used to stupefy fish in most parts of India (*Bomb Gaz, XV Pt I 63*)

Structure of the Wood—White shining warps in seasoning moderately hard even grained said to be durable The radial section is beautifully mottled with the medullary rays which appear as irregular plates Weight 46 lbs per cubic foot (*Gamble*) "The wood is reddish and though tough and strong is not in general use A seasoned cubic foot weighs 56 lbs. (*Bomb Gaz XV Pt I 63*)

It is used for boat building well work carts rice-pounders, and cabinet-making **Beddome** says the wood turns black when buried in mud

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Barringtonia pterocarpa, Kurz, Fl Br Ind, II, 509

Vern.—*Kyátha* BURM

Habitat—A small evergreen tree of Pegu and Tenasserim

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B racemosa, Blume, Fl Br Ind, II, 507

Syn.—**B RACEMOSA Roxb Fl Ind Ed C B C 446 Wight, Ic t 151**

Vern.—*Samundra cuddapah* TAM, MAL, *Samundra phal* BENG; *Jyul Hind Nivar* KONKAN *Kywigyi Kyai-beng*, BURM; *Doya midella* SINGH

B 193

TAN
Bark
181
MEDICINE
Leaves
182
Fruit
183
Root
184
Seeds
185

MEDICINE
Juice
186

187

Snuff
188
A Cosmetic
189

FISH POISON
Bark
190
TIMBER
191

| Indian Spinach | BASELLA alba. |
|--|--|
| <p>Habitat.—A moderate-sized, evergreen tree with spikes of pink flowers common on the Eastern and Western Coasts, from the Konkan to the Sunderbuns Burma Andaman Islands Ceylon and Malacca</p> | |
| <p>Properties and Uses—</p> | |
| <p>Medicine—The ROOT of the plant resembles Cinchona in medicinal virtues It has deobstruent and cooling properties The FRUIT is efficacious in coughs, asthma, and diarrhoea The SEEDS are used in colic and ophthalmia.</p> | <p>MEDICINE Root. 104 Fruit. 105 Seed 106</p> |
| <p>The pulverised fruit is used as snuff and combined with other remedies is applied externally in diseases of the skin (<i>Treasury of Botany</i>)</p> | |
| <p>§ The powder of fruit is used in skin diseases (<i>Deputy Surgeon General G Bidie C I E Madras</i>)</p> | |
| <p>Structure of the Wood—Wood white very soft porous Weight 27 lbs per cubic foot Skinner gives 53 lbs and says it is used for house and cart building and that it has been tried for railway sleepers</p> | <p>TIMBER. 197</p> |
| <p>Barringtonia speciosa, Forst, Fl Br Ind, II, 507 Wight Icon t 547</p> | <p>198</p> |
| <p>Vern—<i>Kyi Kyagye</i> BURM <i>Dod-dá</i> ANDAMANS</p> | |
| <p>Habitat.—A small glabrous tree with entire leaves a native of the Andaman Islands Singapore and Ceylon occurs also on the Southern Deccan Peninsula but not wild</p> | |
| <p>Properties and Uses—</p> | |
| <p>Oil—In the Moluccas a lamp-oil is said to be expressed from the seeds of this plant (<i>Treasury of Botany</i>)</p> | <p>OIL. 100</p> |
| <p>Medicine—Several brief notices have appeared regarding the properties of this plant (<i>See Indian Forester X 75 and the Report of the Chemical Examiner British Burma August 1883</i>) The active principle of the bark appears to be a volatile oil combined with a resin The drug is simply narcotic it stupefies fish without killing them</p> | <p>MEDICINE Bark 200</p> |
| <p>Domestic Uses.—When dry the fruits are sometimes used as fishing floats (<i>Smith's Econ Dict</i>)</p> | <p>DOMESTIC Fruits used as fishing floats. 201</p> |
| <p>BASELLA, Linn Gen Pl III, 76</p> | <p>202</p> |
| <p>A genus of CHENOPODIACEÆ containing only one species which however in cultivation assumes 2 or 3 distinct forms bearing specific names A herbaceous, succulent glabrous climber freely branched <i>Leaves</i> ovate oblong or cordate alternate subsessile or petioled acute or obtuse entire <i>Flowers</i> in short axillary spikes, or simple elongated spikes, or branched white or red <i>Flowers</i> hermaphrodite sessile <i>perianth</i> fleshy compressed to about the middle cut into 5 erect obtuse teeth <i>Stamens</i> 5 inserted in the mouth of the tube <i>Ovary</i> globose styles 3 connate at the base <i>seed</i> solitary, <i>albumen</i> very small <i>embryo</i> coiled up</p> | |
| <p>The generic name is said to be the Malabar name of the plant it is sometimes spoken of as the Malabar Nightshade For convenience of reference to the economic facts the names B alba and B rubra have been retained</p> | |
| <p>Basella alba, L Wight Icon, t 896 CHENOPODIACEÆ.</p> | <p>203</p> |
| <p>INDIAN SPINACH</p> | |
| <p>Vern.—<i>Pôl</i> (cultivated) <i>bon-pôl</i> (wild) <i>myal-tt-bhâys</i> <i>susfid-bachlâ</i> HIND <i>Susfid-bachla-tt-bhâys</i> DUK. <i>Pôl</i> CUTCH SIND <i>Vasla-kire</i>, TAM ; <i>Alu bachchals</i> <i>karu-bach-chals</i> <i>polam-bachchals</i> <i>pedda-bach-chals</i> (a variety) TEL <i>Basella kîra</i>, MAL</p> | |
| <p>Habitat.—Cultivated in almost every part of India, especially in lower Bengal and Assam</p> | |

BASKET-WORK.

Plants used for Basket-work

- DYE**
204
MEDICINE.
Leaves
205
FOOD
Leaves and
Stems
206
- Properties and Uses—**
Dye—It yields a very rich purple dye which is however difficult to fix (*Drury*) This is said to be obtained chiefly from the form which received the name of *B cordifolia*.
Medicine—*Murray* mentions this plant amongst his drugs, but says nothing about its medicinal properties
§ The leaves are made into a pulp used to hasten suppuration (*Surgeon C & W Meadows Burrissal*) Cooling properties" (*Surgeon W Barren Bhuj Cutch Bombay*)
Food—The succulent leaves and stems are used as a pot herb (made into curry) by natives of all classes. Indeed this forms a most important article of food scarcely a village exists in Bengal at least where a hedge-row covered with this favourite pot herb may not be seen
§ It is a very wholesome vegetable and makes a good spinach It is much better than the ordinary (*ság*) greens of the country (*Surgeon K D Ghose M D Khulna*) Both this and the next form have similar properties and are much used as vegetables (*Surgeon Major W Dymock Bombay*) Contains a good deal of mucilage and is used as substitute for spinach (*Surgeon Major P N Mukerji Cuttack Orissa*)

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Basella rubra, Linn

Vern—*Pis, lál bachlá* HIND *Rukto-pás púsák, BENG* *Lál bachlé kí-bhá; DUK* *Shivappu-vasla kire* TAM *Alla batsalla, pedda mattu neathu-batsala erra allu bach chali* TEL *Putiká* SANS *Chovvauna basella kura* MAL

Habitat—Met with in Bengal and indeed throughout India under cultivation

Properties and Uses—

MEDICINE
Juice of the
Leaves
208

Medicine—The juice of the leaves is used in native practice in catarrhal affections of children

§ Leaves made into pulp to hasten suppuration (*Surgeon C & W Meadows Burrissal*) Demulcent and diuretic useful in gonorrhœa balanitis (*Assistant Surgeon J N Dey Feypur*)

Food—As with the preceding form this is cultivated as a pot herb

FOOD
209
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Basket-work & Wicker-work, List of the more important plants used for—

In this class the fibres have not been specially prepared or spun and woven but either entire or after having been treated in a required manner they are worked into baskets or mats by hand

Alnus nitida (baskets)
Andropogon muricatus (mats)
Arundinaria falcata (baskets)
A racemosa (mats)
Bambusa arundinacea (baskets)
B Tulda (mats)
Borassus flabelliformis (mats, baskets)
Calamus Rotang (baskets)
Caryota urens (baskets)
Cocos nucifera (mats)
Corypha umbraculifera (mats.)
Cyperus Pongarie (mats)
C. tegetum (floor mats)
Dendrocalamus strictus (baskets)
Hibiscus tiliaceus (mats)
Indigofera atropurpurea (baskets)
I heterantha (baskets)

Juncus effusus (mats)
Macrochloa (Stipa) tenacissima (mats baskets)
Maranta dichotoma (Shital pat) (mats)
Melocanna bambusoides (mats)
Moringa pterygosperma (mats)
Nannorrhops Ritchieana (matting baskets leaves used for)
Pandanus odoratissimus (matting)
Parrotia Jacquemontiana (baskets)
Phoenix farinifera (mats)
P syvestris (mats baskets)
Phragmites Roxburghii (durma) (mats)
Pseudostachyum polymorphum (baskets, mats)
Rhus Cotinus (basket-making)

B 210

| The Butter Tree. | BASSIA butyracea |
|---|---|
| <p><i>Saccharum Sara</i> (mats leaves used for) <i>S. Munja</i> (mats) <i>Saccharum spontaneum</i> (mats, grass used for). <i>Salix babyionica</i> (baskets)</p> | <p><i>Salix daphnoides</i> (baskets) <i>S. tetrasperma</i> (baskets) <i>S. Wallichiana</i> (baskets) <i>Tamarix dioica</i> (baskets) <i>Typha angustifolia</i> (mats) <i>T. elephantina</i> (mats)</p> |
| <p>BASSIA, Linn Gen Pl II 658</p> | |
| <p>A genus of trees belonging to the Natural Order SAPOTACEÆ comprising some 30 species inhabitants of India and the Malay <i>Leaves</i> petioled, coriaceous silky or tomentose beneath when young; <i>stipules</i> caducous <i>Peduncles</i> axillary fascicled among the sub-terminal tufts of leaves or in the axils of fallen leaves <i>Calyx segments</i> 4 2 seriate 2 outer valvate enclosing the inner (except in <i>B. butyracea</i>) <i>Corolla tube</i> campanulate lobes 6-12. <i>Stamens</i> at least twice as many as the petals <i>anthers</i> lanceolate acute connective often mucronate or excurrent <i>Ovary</i> villous 4 12-celled <i>Berry</i> globose <i>Seeds</i> ellipsoid hilum long sometimes large; <i>Albumen</i> none <i>radicle</i> very small</p> | |
| <p>The genus is named in honour of Fernando Bassi a former Curator of the Botanic Gardens at Bologna.</p> | |
| <p>Bassia butyracea, Roxb Fl Br Ind, III, 546 SAPOTACEÆ</p> | 212 |
| <p>THE INDIAN BUTTER TREE</p> | |
| <p>Vern.—<i>Chiura</i> or <i>chyura</i> or <i>chúra</i> <i>chasura</i> <i>bhulel</i> KUMAON; <i>Chouli</i> OUDH <i>Phalwara</i> or <i>phulodrá</i> HIND; <i>Chári</i> NEPAL <i>Yel yel pote</i> LEPCHA</p> | |
| <p>The butter from the fruits is called <i>chiura ke pina</i> (Almora) and <i>phalel phulel</i> or <i>phalwára phulwa</i> (in the plains)</p> | |
| <p>Habitat.—A deciduous tree of the Sub-Himálayan tract from Kumaon to Bhutan between 1 000 and 5,000 feet</p> | |
| <p>In Mr Atkinson's manuscript this tree is stated to be very abundant at Pithoragurh where the bees feed on its fragrant flowers hence the honey is highly esteemed It is also common in the valley of the Kálf</p> | |
| <p>Botanic Diagnosis—Leaves obovate or obovate-oblong calyx lobes 5, much imbricate but not 2 seriate corolla-tube not fleshy lobes spreading stamens 30-40 filaments glabrous as long as the anthers</p> | |
| <p>Properties and Uses—</p> | |
| <p>Oil—The seeds on expression yield a concrete oil known as <i>phulwa</i>. This is extracted by beating the seeds to a consistence of cream and placing the mass thus obtained in a cloth bag upon which a weight is laid until all the oil or fat is expressed This becomes of the consistence of hog's lard is inodorous and of a delicate white colour it contains 34 parts of fluid oil and 6 parts of vegetable matter (<i>Mr E Solly</i>) It dissolves readily in warm alcohol leaving the vegetable impurities undissolved. At 95° it retains its consistency but melts completely at 120 (<i>Roxburgh in Asiatic Researches VIII 447</i>) This vegetable butter being cheaper than <i>ghí</i> is sometimes used as an adulterant It is burned in lamps and as it burns with a bright light without smoke or smell it may be utilised in the manufacture of candles It makes excellent soap Its oil has many properties which should commend it to the attention of the candle and soap makers, and it is surprising that it has not taken a better position during the past half century (<i>Don, Prod. Nepal, 146 Roy's Illustr. 15 Trail in Proceed. Corres. Commerce and Agriculture, Royal Asiatic Soc., p 115</i> also a complete and interesting account by the Editor, <i>Four Agri.-Hort Soc of India, Vol. I., 19</i>)</p> | |
| <p>B. 213</p> | |

OIL
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BASSIA
latifolia.**MEDICINE**
Butter
214

FOOD
Pulp of Fruit
215
Cake after
expression of
Oil
216
Syrup
217
Sugar
218
TIMBER
219
220

The Mahuá,

Medicine—The butter is highly valued on account of its efficacy in rheumatism especially in contraction of the limbs and other painful affections. It seems deserving of further attention. As a hair-oil perfumed with attar of roses and other sweet scented oils it is largely used as a valuable preservative to the hair. Made into perfumed ointments it is also extensively used by the wealthier classes. It is an excellent emollient for chapped hands (*Pharm of India Roxburgh Voigt Baden Powell Pb Pr I 423 Atkinson, Him Dist, 715 Year Book of Pharm 1878 258*).

Food—The pulp of the fruit is eaten and also the cake left after the expression of the oil. The flowers are not eaten but from them a sweet syrup is prepared which is boiled down into sugar. The sugar thus prepared resembles in appearance that prepared from the date-palm.

The grain is very small and as *gur* would fetch considerably less than the finer specimens of cane-sugar. It was however equal if not superior to ordinary date-sugar of which such abundant supplies reach Calcutta (*Four Agri Hort Soc of India I 22*). As already stated the oil is both eaten and used as an adulterant for *ghi*.

Structure of the wood—Wood light brown hard annual rings marked by a dark line. Weight 52 lbs per cubic foot.

Bassia latifolia, Roxb Fl Br Ind, III 544

THE BUTTER OR MAHUÁ TREE

Vern—*Mahwa mahud mahulá mauí janglí-mohá janglí-mohud mowá* HIND OUDH *Mahwa banmahuva mahula mauí* BENO *Moha URIYA Mandukum KOL; Mohul BHUMIJ and MAL (S P) Mathom SANTAL Mahurá BHIL (SURAT) Mahu BAIGAS Irup irup irhu GOND Mohu KURKU Mhowa C P Mowa mahua mohá BOMB Janglí mohá moha DUK Mahuda or mahura GUJ Mowda randcha mōhacha-jhāda rānacha ippecha jhāda moho mora maha MAR Illupí elupa kat illipí kathi iluppi kattiuluppi kattu irrupai TAM Ippi ippa yeppa adavi ippe-chettu TEL Hogne hippe, kádu ippe gida KAN Poonam káttirippa bonam MALA Madhuka atavi madhuka vriksha SANS Darakhie gulchakane-sahrás PERS Kansan BURM Quindah (the oil)*

Habitat—A large deciduous tree indigenous in the forests of the Central Provinces it may in fact be said to extend from Kangra Kumaon, and Oudh through the Central Provinces and Chutia Nagpur to the Western Ghāts and distributed in the south east to Ava. It is plentiful in many parts of the Bombay Presidency especially in Gujarat. It forms gregarious forests generally associated with the *Sál* abundant where met with it may be described as forming scattered and isolated forests over the region indicated. It gradually disappears towards Calcutta and is only sparingly met with in the Madras Presidency its place being taken by *B longifolia*. Dr Stewart does not regard the plant as indigenous to the Panjáb.

Botanic Diagnosis—Leaves elliptic or oblong elliptic shortly acuminate calyx lobes 4 the 2 outer sub-valvate including the others, rusty tomentose corolla tube fleshy lobes erect anthers 20-30, 3 seriate subsessile. It attains a height of 40 to 60 feet.

The *Mahua* thrives on dry stony ground. It is protected by the natives, but is not artificially planted. It sheds its leaves from February to April. The cream-coloured flowers clustering near the ends of the branches appear in March and April and are soon followed by the new leaf-buds. The fruits are green when unripe and reddish yellow or orange when ripe, fleshy one to two inches in length with one to four seeds, which ripen about three months after the flowers have fallen. The tree is valued for its flowers its fruit, its seed, and its timber, and is of

or Illipi Butter Tree.

BASSIA
latifolia.

considerable economic importance to a large proportion of the poorer classes of the natives of India. (*Liottard*)

Properties and Uses—

Gum.—It yields a white milky gum from incisions and from cracks in the bark. The discharge of gum is facilitated by a process of ringing the trees, practised in Chutia Nagpur during the fruiting season. The gum does not seem to be of any economic value.

Dye.—The BARK is often used as an adjunct in dyeing where dark colours or black are desired along with the leaves it is also sometimes employed as a tan.

THE OIL

Oil.—A greenish-yellow oil eaten by the Gonds and other Central Indian tribes is extracted from the kernel of the fruit; it is used to adulterate *ghí*. This is sometimes called *Dolí* oil, especially in Western India, the same name being applied to the seeds. It is called *Madhuka Sára* in Sanskrit and is recommended as a medicine. It is often sold in the form of cakes which keep fresh for a few months in cold climates but in the plains of India they soon become rancid separating into a clear oil and a brown fatty substance. The cakes are sold as *Illipi Butter*.

To extract the oil the kernels are taken out from the smooth chestnut coloured pericarp by being bruised rubbed and subjected to a moderate pressure. They are then ground and the oil obtained by cold expression. In the Central Provinces the kernels are pounded and boiled and then wrapped up in two or three folds of cloth and the oil thereafter expressed. In the western tracts of Bengal and in the Central Provinces besides being used for lighting this oil forms a very inexpensive substitute for *ghí*. It is a useful oil for soap and is largely used by the poorer classes as a lamp oil.

CANDLE AND SOAP TRADE.—The following interesting passage is extracted from *Drury's Useful Plants of India*. In 1848 a quantity of *Mahwah* oil was forwarded to the Secretary of the East India and China Association with the view of ascertaining its market value and applicability for the manufacture of candles and soap. The managing director of Price's Patent Candle Company stated in reply: "I beg to inform you that the *Mowah* oil of which you furnished us samples is worth in this country for the manufacture of candles £8 per ton less than Petersburg tallow. We have tried a great many experiments upon it, and found it to be of the same value as coconut oil and its being harder makes up for the colour being inferior. Large quantities could be used in this country at about £35 per ton."

In Gujarát, "Soap is manufactured by Musalmans. This is made by mixing alkali soda and lime in water and allowing them to soak for some hours. The water is then drawn off and a quantity of *mahuda* oil, *dolí* is added, and the whole boiled in large brick caldrons. When ready the mixture is run off into shallow brick troughs and left to cool. It is then gathered into a large heap pounded with heavy wooden mallets and cut into round cakes. According to the amount of *mahuda* oil it contains, soap varies in price from 14d to 3d (1 2 annas) the cake. (*Bombay Gazetteer III 76*). In Ahmedabad, soap is made from the oil of this tree called *dolí* oil. The oil is largely burned by the Bhils and other hill tribes. In the Deccan the oil is used for making country soap."

The Gazetteer of the Central Provinces remarks that for the purpose of preparing the "oil the exports of the seed might be largely increased. "The seed of the *mahua* (which succeeds the flower from which the spirit is made) is extensively used for the manufacture of oil for burning; and the failure of the *mahua* crop is usually followed by a high price of oil."

GUM.
221

DYE
222
TAN
223

OIL
Cakes.
224
Liquid
225
Fatty Matter
226
Clear Oil
227

CANDLE &
SOAP
228

Gujarat Soap.
229
Ahmedabad
Soap
230
Other Mahua
Soaps
231

BASSIA
latifolia.**The Mahua.**

throughout the year in which the failure occurs (*Oudh Gasetteer III 71*)

MEDICINAL PROPERTIES**MEDICINE****Flowers****232****Seeds****233****Oil****234****Cake****235****Spirit****236****Leaves.****237****Milky sap****238****Bark****239****Fish poison****240****Rat and
insect poison****241****242**

Medicine—The FLOWERS are used in coughs in the form of a decoction. The medicinal properties attributed to this plant are stimulant, demulcent and emollient, heating, astringent, tonic and nutritive. The SEEDS yield on expression a thick concrete OIL which is recommended to be applied to the head in cephalalgia. The oil is much valued by hill tribes in the treatment of skin diseases. The residuum or CAKE left after the expression of the oil is employed as an emetic and also as a detergent.

According to the *Pharmacopæia of India* "the SPIRIT distilled from the flowers has a strong smoky odour somewhat resembling Irish whisky and rather a pungent fœtid flavour which however disappears with age. The freshly distilled spirit proves very deleterious, exciting gastric irritation and other unpleasant effects. Dr U O Dutt says this spirit is described by *Susruta* as heating, astringent, tonic and appetising. The *Pharmacopæia* adds that Dr Dutt reports having used the weaker (diluted ?) spirit extensively and in his opinion it is less injurious to the digestive system than rum, more resembling beer in its effects on the constitution and nutrition of the body. This view is coincident with that of Dr W Wright. It is evidently a powerful diffusible stimulant and when matured by age may be used as such when brandy and other agents of the same class are not available (*Pharm Ind 131*). The LEAVES are boiled in water and given as a cure for several diseases; they make a good embrocation. The MILK of the green fruit and of the tender bark is given as a medicine (*Voigt*).

Dr Irvine (*Mat Med Patna*) says that the BARK is used in decoction as an astringent and tonic. The bark is sometimes used as a remedy for rheumatic affections (*Mysore Catalogue Calcutta Exhibition*). Voigt says it is rubbed on the body as a cure for itch.

The residue cake after the extraction of the oil is said to be used to poison fish. This seems doubtful but the statement is made by several writers. The smoke produced in burning the cake is reputed to kill insects and rats.

Special Opinions—§ Used as a detergent in the southern districts of Madras (*Hon Surgeon E A Morris Negapatam*). "The expressed oil is applied to the arms of children to allay the extreme itchiness sometimes caused by the presence of intestinal worms (*A Surgeon Aligarh*). The flowers mixed with milk are used in impotence due to general debility; they are given in doses of about one ounce with eight ounces of fresh milk, and are often an efficient remedy. The dried flowers are used as a fomentation in cases of orchitis for their sedative effect (*Hospital Assistant Lal Mahomed Hoshangabad Central Provinces*). The flowers of the *mowa* appear to impart their peculiar odour to the secretions of the body when eaten. This is notably the case in cattle the milk being flavoured when they are allowed to feed on *mowa* (*Surgeon S H Browne M D Hoshangabad Central Provinces*). The flowers are sometimes boiled and eaten by the lower classes. I know a case of dangerous vomiting with brain symptoms caused by eating an excess quantity of flowers. The spirit if carefully prepared and re-distilled is not deleterious (*Surgeon Shob Chunder Bhattacharya, Chanda Central Provinces*).

FOOD

Food—The FRUIT is sometimes eaten but the principal edible structure is the succulently-developed FLOWERS (i.e., corollas); these are

FOOD
Flowers
243

B. 243

or Illipi Butter Tree.

BASSIA
latifolia.

eaten raw or cooked, or in the form of sweetmeats. SUGAR may also be prepared from the flowers. In many parts of the country they are baked into CAKES. The SEEDS also may be eaten but it is chiefly valuable for the oil which it yields on expression the cake being utilised as an article of food both for men and animals. The flowers afford both food and drink to a large number of persons during a great part of the year, viz., from March to September. After having been steeped in water and allowed to ferment a SPIRIT is distilled from them which is largely consumed by the inhabitants of the mountainous tracts of the central table-land of India. In a note by Mr. Liotard, published by the Revenue and Agricultural Department an interesting abstract of information regarding *mahuá* will be found from which the following passage may be republished here.

When the buds appear the people clear the jungle from below the trees and when the flowers fall women and children and sometimes men may be seen busily occupied in the early mornings gathering large quantities. It is reckoned that each tree during the season gives from 6 to 8 maunds of flowers the quantity varying according to the size of the tree and the nature of the season. This is used in two ways (1) as an article of food, and (2) as a material for the manufacture of a spirituous liquor.

As an article of food it possesses when fresh a peculiar luscious taste, with an odour somewhat suggestive of mice. When dried the flavour has some resemblance to that of inferior kinds of figs and forms an important addition to the food supply of the poorer classes of parts of the country in which the tree grows in abundance. Under the Mahratta rule it is said to have been a common practice to cut down the *mahuá* trees in the Bhil country so as to afflict the lawless hill tribes and reduce them to straits. This shows how much the people depend on the produce of these trees for food. The flowers are used either freshly gathered or after being sun-dried. They are eaten cooked or uncooked often with parched grain or with the seeds of the *sál* tree or with leaves of other plants. Jackals bears wild pigs, and deer are very fond of *mahuá*.

For the manufacture of spirits the flowers when dried are sold by the hill people at various rates either to the village distillers or to the *baniahs* by whom they are exported. The dried flowers are immersed in water for four days they are then fermented, and thereafter distilled. The liquor produced from a single distillation is extremely weak ranging from 60° to 90° under proof. But a second distillation is sometimes resorted to, especially where still-head duty is levied irrespective of strength and in this case a spirit averaging 25° below proof is obtained. The distillation is practised in the Panjáb to a small extent in Rájputana every village apparently has its spirit shop for the sale of the distilled liquor; in the North-West Provinces and Oudh the liquor is made in the eastern and southern districts and is of common use among certain classes in the western districts of Bengal it is abundantly distilled so also in the Central Provinces and in parts of the Bombay Presidency, especially in the northern and southern divisions.

ABSTRACT OF PROVINCIAL REPORTS REGARDING THE VALUE OF MAHUÁ

An indefinite series of extracts from published works might be given to illustrate how exceedingly important the *mahuá* tree is to the hill tribes of India. In the *Bombay Gazetteer* (XII 26) will be found the following passage "Its chief value lies in the pulpy bell-shaped flower, which when dried, is eaten by the natives and is distilled into the common spirit of the country. Almost every animal, wild or domestic, eats the fresh flowers. It is an important article of trade and during the hot months is the chief means of subsistence to the Bhils and other hill tribes. The wood is hard and lasting, but the tree is too valuable to be cut

Fruits.
244
Sugar
245
Cakes.
246
Seeds
247
Spirit
248

PANJAB.
249

BOMBAY
250

**BASSIA
latifolia.****The Mahuá****BOMBAY**

for timber. The seed when allowed to form is enclosed in a thick walnut like pod. It yields an excellent oil good for food and burning, and also for skin diseases. The leaves and bark make useful embrocations. Altogether the *moha* is one of the most valuable of Khándesh trees but as it grows in the wildest forests most of the produce is lost or supports wild animals only. In the open country a few good *moha* trees are a small fortune.

The *mahuá* with its strongly veined leaves and its heavy sickly smelling flowers is in every respect a noble tree and of great value to the district. For months in the year its flowers and fruits are meat and drink to many of the poorer classes and its timber is of excellent quality (*Bombay Gasetteer III 198*). "In Gujarát and Rájputana every vil lage has its spirit shop for the sale of the distilled liquor from the flowers. In the Island of Caranja opposite to Bombay the Government duty on the spirits distilled (chiefly from this flower) amounts to at least £60 000 per annum. I rather think that £80 000 is more generally the sum. The Parsis are the great distillers and sellers of it in all the country between Surat and Bombay and they usually push their distilleries and shops into the heart of the forest which lines the eastern border and hills of those countries. The spirit produced from *Bassia* is when carefully distilled much like good Irish whisky having a strong smoky and rather foetid flavour. This latter disappears with age" (*Dr Gibson in Hooker's Journ Bot 1853 p 90*).

**CENTRAL
PROVINCES
251**

In the Central Provinces the poor people draw half their sustenance from the fleshy flowers at certain seasons of the year. The spirit most used in the Central Provinces is the *dáru* distilled from *mhowa* (*C P Gas Intro p cxlv*). Mr J G Nicholls Commissioner of Excise on enquiries instituted with regard to the *mahuá* of the Central Provinces obtained valuable information. Summarising the reports which he received, it would be within the mark to say that in the Central Provinces alone over 1 400 000 persons use the *mahuá* as a regular article of food. The following extract from Mr Nicholls' paper on the value of *mahuá* (or *mohuá*) (taken from the *Indian Forester V 475*) will be found highly instructive. "From my enquiries I am led to believe that one maund for the annual consumption of each individual is a moderate and quite safe estimate. But one maund of *mohuá* sets free more than an equal weight of grain probably one and a half maunds.

**A saving
through
Mahua.
252**

Mr Fernandez Assistant Conservator of Forests has given this matter his special attention. He calculates that a frugal family will save 30 per cent of grain on the average annual consumption of cereals by the partial and seasonable substitution of *mohuá* flower and oil.

"I will first estimate the saving to be only $1\frac{1}{4}$ maunds of grain for each person 5 maunds being the annual average consumption of each individual of the population. This represents 17,50 000 maunds of grain saved or we may calculate in another way that this supplementary source of food supply sets free so much of our arable land as would be required to produce an extra 17 50 000 maunds of cereals to be more profitably employed in the cultivation of cotton linseed, and the more valuable agricultural products resulting in a still larger balance of trade in favour of these Provinces.

But so as to be sure of avoiding an over-estimate suppose the saving to be only 12 50 000 maunds a year. This sets free so many maunds of the highest priced grain mostly for export out of the provinces. Calculating at 20 seers to the rupee, this would represent one quarter of a million of pounds sterling as the value of the *mohuá* crop to these Provinces in ordinary years, exclusive of what is used for distillation. The latter want

The Mahul.

BASSIA latifolia.

CENTRAL PROVINCES.

will always, in ordinary years, be first provided for because good prices would be forthcoming

"The *mohul* used for distillation yields a revenue of close on ten lakhs of rupees a year raised, in a way by self imposed taxation on classes who could not otherwise (save by the salt tax) be made to pay their quota towards the expenses of the State.

At the lowest valuation in ordinary years the *mohul* produce is worth to the country at large not less than 35 lakhs of rupees

In times of scarcity its economic as well as its monetary value rises with the intensity of the distress it often becomes of vital importance It must be remembered that failure of agricultural crops in these Provinces is more frequently the result of excessive rainfall than of drought The *mohul* crop would be unaffected by an excessive rainfall in the period of the monsoon It suffers from drought to some extent more so from frost. Where but for this supplementary source of food supply, we should experience famine with it we should only have distress Without it I think we should always have chronic scarcity in the wildest parts of the Provinces

We are now called on to part with a portion of our crop for export to Bombay It is understood that besides the demand in that direction for the purpose of distillation and for consumption as food it is also required for use in the manufactures in connection with ship painting and caulking I have no reliable information on this point I mention what I have been told for what it may be worth But at any time demands may arise at the bidding of the chemist and the manufacturer in quarters where the purchasing power would be so great as to draw off much of our crop It is not unlikely that the distillers of the North Western Provinces will soon begin to indent for *mohul* on our northern districts

Taking the lowest valuation of the crop at 35 lakhs of rupees and capitalising this at 15 years purchase we get the present value of the bearing trees as flower and oil producing sources represented by 5½ millions sterling

"But to replace the present existing trees in full bearing would require much more than fifteen years Considering this and the cost of artificially stimulated reproduction together with the incidental disturbances of the normal conditions of life double this amount would scarcely compensate the Provinces for their sudden destruction

This goodly endowment from the hands of bountiful Nature this inheritance may not with impunity be wrecked or impaired It should be held as a great trust to be left at the least intact by the present generation for the support and enjoyment of generations yet unborn"

In Oudh it is principally found in the western half of Pertabgarh. The flower withers in April and drops from the tree during the night There are calculated to be 434 570 trees in the district. Assuming each tree to yield 20 seers this at the average price would give a value of Rs.144,856 As a rule the *mahul* crop is good only once in every three years (*Oudh Gaz III 71 72*)

The following extract from the "Statistical Account of Bengal" gives the substance of Mr Forbes' Settlement Report of Palamau with regard to *mahul* "The most important of all the indigenous jungle products is the flower of the *mahul* tree as the abundance or deficiency of this crop affects the market price of all other foods throughout the year The total number of *mahul* trees in Palamau, from which fruit was regularly gathered, was estimated by Mr Forbes in 1869 at 113,885 of which 18,492 belonged to Government farms and were specially dealt with at the time of the settlement. All were of indigenous growth and it appears not to be the practice to rear trees artificially"

Annual value
Rs5 00 000

**OUDH
253**

Rs 144,856.

**BENGAL.
Palamau.
254**

BASSIA
latifolia.**The Mahuá.****BENGAL.**

Mahuá blossoms are rarely eaten fresh but are dried on a smooth floor of cow dung and mud until they shrivel to a quarter of their original size and take a light brown colour so as to resemble raisins. They are usually prepared by boiling. This takes all the flavour out of the flower, and it is therefore eaten with the seeds of the *sál* tree called *sarráys*, or some acid leaves or herbs to give it a relish. Those who can afford to do so eat *mahuá* fried in *ghí* or butter. The yield of a *mahuá* tree varies very much in different seasons. A large tree will bear in a good season from 4 maunds 2 seers to 4 maunds 29 seers of ripe blossom but the average yield is about 2 maunds 28 seers which when dry does not weigh more than 1 maund 14 seers. Of late years the price of *mahuá* blossom has risen. It used to sell at 3 maunds for the rupee but at the present market value about a rupee and a half is paid for 2 maunds. During the distress of 1869 the price rose to 14 and 11 seers per rupee. The fruit of the *mahuá* tree begins to form immediately after the fall of the blossoms and ripens in June. The weight of the yield of fruit generally equals that of the crop of blossom. Natives never gather the fruit or even shake the tree to make it fall the belief being that if this were done the tree would not bear in the following year. When ripe the *mahuá* fruit is about as big as a peach and is made up of three separate envelopes with a white nut or kernel inside. The two outer skins are either eaten raw or cooked as vegetable and the inner coating is dried and ground up into a kind of meal. Of the kernel itself an oil is made four seers of kernels making one seer of oil which is largely used both for cooking and for adulterating *ghí*. Before however it can be used for the latter purpose it must be clarified with butter milk to prevent its offensive smell from being detected in the *ghí*. The oil sells at 9 seers for the rupee. The amount annually made is small and it can rarely be purchased two months after the manufacturing season is over. (*Dr W W Hunter's Statistical Account of Bengal Vol XVI pp 243 44*)

Hazaribagh
255

In Mr V Ball's account of *mahuá* in the *Journal of the Asiatic Society No 11 of 1867* incorporated in *Hunter's Statistical Account of Bengal* will be found the following interesting account of the *mahuá* tree in the Hazaribagh District. The duty of collecting the fallen blossoms is chiefly performed by women and children at dawn they may be seen leaving their villages with empty baskets and a supply of water for the day's use. Before the crop has commenced to fall they take the precaution to burn away the grass and leaves at the foot of the tree so that none of the blossoms may be hidden when they fall. The gleaners generally remain under the trees all day alternately sleeping and collecting the crop the male members of the family visiting the trees once or twice during the day bear off the produce in *banghis*. It often happens that the people who collect come from a considerable distance in which case they erect with the branches of *sál* a temporary encampment of huts in which they live until the crop is all gathered in. In front of each of these huts a piece of ground is made quite smooth and hard for the purpose of spreading out the flower to dry. When perfectly dry the blossoms have a reddish-brown colour having lost three fourths of their original dimensions and about half their original weight. It is the custom with some of the natives before spreading them out to dry to pull off the little ring of foliaceous lobes which crowns the fleshy corolla. It is very difficult to collect trustworthy statistics regarding the amount of yield of the *mahuá* trees. I have been told and it has been repeated to me several times, that a first-class tree will yield two maunds a day and that this will continue for fifteen days. This estimate, I believe, is more than double the real facts. The rent of the trees varies much according to their abundance in the district, the quality

The Mahuá.

of the previous rice crop and various other circumstances affecting the demand and supply. In parts of Házáribágh I have known ten small trees to be let for a rupee while a single fine larger one would sometimes bring the same amount. In Mámbhúm I have been pointed out trees for which a sum of from two to three rupees was charged, but I have also heard of trees being hired in the same district for four annas. Two maunds of *mahuá* are stated by some to furnish a month's food to a family consisting of a father, mother and three children. It is, however, seldom eaten alone being much more frequently mixed with the seeds of *sál* or with some of the leaves of the plants which are collectively called *ság*. The cooking is performed as follows. The *sal* seeds, having been previously well dried in the sun, are roasted and then boiled alone. The *mahuá* flowers are then also boiled and the water is thrown away. So far having been cooked separately they are then mixed and reheated, sometimes a small quantity of rice is added. It is the custom to cook but once a day and each member of the family helps himself whenever he feels hungry. (Dr W W Hunter's Statistical Account of Bengal Vol XVI pp 48 49)

Mr Lockwood (formerly Magistrate and Collector of Monghyr) published in the Indian Society's Journal (Vol XVII 89) a most instructive account of *Mahua* the facts of which may be said to be applicable to every district in which the plant occurs. The following extract may therefore be republished here. During the season of scarcity which prevailed at Behar in the year 1873 74 the *mahwa* crop which was unusually abundant, kept thousands of poor people from starving and all famine officers will recall its peculiar odour as they passed through the villages where it had been collected. The residue of the *mahwa* which is not eaten is taken to the distilleries and there with the aid of rude pot stills is converted into a strong smelling spirit which bears considerable resemblance to whisky. The Government holds a monopoly of spirit manufacture and when I first went to Monghyr in 1873, the custom was to charge a duty of eight shillings for every cwt of the raw material as it entered the distillery on the supposition that so much *mahwa* would only yield three gallons of proof spirit. Subsequently in consequence of experiments made by the officers under me this duty was somewhat raised but in England I find that over six gallons of proof spirit can be produced from a cwt of *mahwa*. The Government of India should be made aware of this fact and it would probably be advantageous to introduce patent stills in the place of the rude machines now in use.

The amount of *mahwa* which nominally paid Government duty yearly in Monghyr was 1750 tons but with patent stills under Government control the *mahwa* would probably yield a much larger revenue to the State. An Italian gentleman who was living at Monghyr when I was there took out a patent for removing by a very simple process the essential oil or whatever it is which gives the *mahwa* spirit its peculiar smell and for some time I thought he would make a rapid fortune. Orders poured in on him from Calcutta, and the demand promised to be immense. But just as the inventor had taken up a whole side of the Government distillery and got all his preparations complete the rum distillers in Calcutta petitioned the Board of Revenue and a prohibitive duty was imposed which completely put an end to the manufacture of scentless *mahwa* spirit. A sample was sent to the Chemical Examiner at Calcutta, and he reported that the spirit was pure and wholesome, and came very near good foreign brandy.

"But not only are the *mahwa* flowers good for distilling spirit they are still more useful for feeding cattle. My father, the Rector of Kingham has been feeding his pigs on the *mahwa* which I brought home and

BASSIA
latifolia.

BENGAL.

Monghyr
256Proof Spirit
(6 gallons
from 1 cwt.
of Mahua.)
257Scentless
spirit from
Mahua.
258For
feeding
Cattle
259

BASSIA
latifolia.**BENGAL.**Keeping
qualities of
the Mahua
200**The Mahua.**

Mahua Pork is beginning to be celebrated in his neighbourhood. Indeed so favourably has it been received, that I have been requested to procure considerable quantities, both for distilling spirit and for feeding cattle. The Bassia family is the only family I know which yields a flower in sufficient quantities for feeding cattle and distilling spirit on a large scale. Potatoes maize and barley which are principally used are costly in production and uncertain in their yield but the *mahwa* crop never fails. The oldest inhabitant in Monghyr had never heard of a season when the *mahwa* crop was not abundant for whether the fruit subsequently forms or not the corolla is certain to be there and certain to fall in great profusion. The extraordinary keeping qualities of *mahwa* form also a further recommendation to its introduction into England. Before leaving India I had a ton shovelled into sacks and put on board a vessel in Calcutta. They were gathered in April 1876 and after being kept for nearly two years are as good as when first dried. No weevil, apparently, attacks these flowers as they attack grain.

India would benefit greatly if *mahwa* flowers met with a demand in England. The vast forests of *mahwa* trees which now yield little profit to their owners would soon become a source of wealth and the collection of the corollas would give work to thousands of poor people who at present inhabit the rocky country where the *mahwa* grows.

To sum up the merits of the *mahwa* flowers for distilling purposes and feeding cattle they are 1 cheapness 2 unlimited supply 3 certain yield 4 nourishing qualities 5 good keeping qualities.

TRADE IN MAHUA**EXTERNAL**

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An effort has lately been made to establish a European trade in *mahua* mainly as a source of spirits of wine and for the purpose of feeding cattle. The following quotations furnished by the Department of Finance and Commerce give all that can be published however, of a definite nature regarding this new trade —

Export of Mahua or Mowra flowers from British India

| | Quantity | Value | Country to which exported | Quantity | Value |
|-----------------------|----------|----------|------------------------------|----------|----------|
| 1883-84 | Cwt | R | | Cwt. | R |
| Bengal | 42 215 | 99 785 | France | 269 215 | 6 70 399 |
| Bombay | 227 114 | 5 70,879 | Other Countries | 114 | 265 |
| TOTAL | 269,329 | 6 70 664 | TOTAL | 269 329 | 6 70,664 |
| 1884-85 (8 months) | | | | | |
| Bengal | 195 | 449 | France | 30,193 | 60,663 |
| Bombay | 30 177 | 60 468 | Other Countries | 179 | 254 |
| TOTAL | 30 372 | 60,917 | TOTAL | 30 372 | 60 917 |

With the view to regulating the trade in *mahua* spirit, the Bombay Government have passed certain legislative measures which have had the effect of making a State monopoly of the purchase of the flowers. Meanwhile the export trade has received an unforeseen check in the attitude taken by the French Government in prohibiting the importation into France of *mahua* flowers. It was found that *mahua* spirit was being used as an

| The Mahuá Tree of South India. | BASSIA longifolia. |
|--|---|
| <p>adulterant for brandy—a new trade which would have materially influenced French interests. This difficulty is much to be regretted, since it may have the effect of retarding the development of the more legitimate trade in this valuable product. Without in any way disturbing the present relations of the <i>mahuá</i> crop as a source of food to the hill tribes, a large and profitable export trade might easily enough be established in <i>mahuá</i> flowers and seeds.</p> | <p>MAHUA TRADE.</p> |
| <p>INTERNAL TRADE.</p> <p><i>Mahuá</i> is one of the most important articles of export from Kaira. Definite information regarding the internal trade as a whole cannot be obtained but in the preceding pages enough has been given to show that the <i>mahuá</i> is an exceedingly valuable plant and a large local trade is done in both the flowers and the seeds.</p> | <p>262</p> |
| <p>§ The flowers are very largely exported to France for the manufacture of inferior brandy (<i>Surgeon K D Ghose Bankura</i>). The spirit is much drunk in Jeypur (Vizagapatam district) (<i>Surgeon Major J Byers Thomas Waltair Visagapatam</i>). Fruits and flowers are eaten by the poor in the Konkan and in Gujarát a spirit is distilled. (<i>Surgeon W Barren Bhuj Cutch</i>).</p> | <p>263</p> |
| <p>Structure of the Wood—Sapwood large heartwood reddish brown from hard to very hard. Annual rings indistinct. A cubic foot of seasoned wood weighs 61 to 68 lbs.</p> | <p>TIMBER. 263</p> |
| <p>It is not much used owing to the flowers being too valuable to allow of the tree being cut for timber—it has been tried for railway sleepers in the Central Provinces and Beddome says it is used for the naves of wheels for door and window frames and panels for furniture and country vessels. Mr O F Manson describes the <i>mahuá</i> as the most generally useful tree of the Santal Pergunnahs. Oleghorn says it is a strong wood but never felled by the natives.</p> | <p>DOMESTIC. Leaves as Plates 264 265</p> |
| <p>Domestic Uses—In many parts of India the broad leaves are used as plates.</p> | |
| <p>Bassia longifolia, Willd Fl Br Ind III 544</p> | |
| <p>THE MOWA OR MAHUÁ TREE OF SOUTH INDIA</p> | |
| <p>Vern—<i>Mohá mohuá</i> HIND <i>Mohuá</i> BENG; <i>Móhd DUK</i>; <i>Madháka</i> SANS <i>Darakhté gulchakán</i> PERS <i>Mahwa mohi</i>, BOMB; <i>Mahuda</i> CUTCH <i>Móhácha-jháda</i> <i>ippícha-jháda</i> MAR <i>Mahudá mowá-nu-jháda</i> GUJ <i>Illupí elupa iluppai iruppai</i> TAM <i>Ippi, yeppa, ippe chettu, pinna-ippa</i> or simply <i>ippa</i> <i>ippa-pé</i> (flower) TEL; <i>Hippe, ippigidá</i> KAN <i>Ellupí irippa</i> MAL <i>Mí SINGH Kan sannu kánsé</i> BURM</p> | |
| <p>Habitat.—A large evergreen tree of South India and Ceylon. Common in Kanára. Mr Baden Powell (quoting Mr Barnes settlement report) must have mistaken this plant for the preceding as he describes it (<i>Pb Prod I 422</i>) as common in Kangra district Panjáb. It is entirely a South Indian plant being common in Mysore Malabar, the Anamallays and the Circars.</p> | |
| <p>Botanic Diagnosis.—Leaves lanceolate narrowed at both ends, glabrous distinctly nerved anthers 16 2-seriate sessile tips 3 toothed young fruit globose densely hirsute.</p> | |
| <p>This should be carefully distinguished from the next species, the character of the fruits readily separating them.</p> | |
| <p>Properties and Uses—</p> | |
| <p>Gum.—Yields an inferior gum known as <i>Ellopa</i>. Ainslie informs us that this is used in Madras as a remedy in rheumatic affections. Roxburgh remarks that there is frequently to be found a drop of whitish, soft tasteless resin on the apices of the flowers before they open.</p> | <p>GUM 266</p> |

BASSORA.**Bassora Gum.****OIL.**
267**Cake a**
Detergent
268**MEDICINE****Leaves**
269**Flowers****270****Seed****271****Bark****272****Juice****273****Spirit****274****FOOD****Flowers****275****Fruits****276****Seeds****277****OIL****278****TIMBER****279****280**

Oil—An oil is expressed from the seeds. It is yellow and semi-solid; used for burning for soap, and to adulterate *ghí*. It is said to be well adapted for the soap trade. It retains its solid form under 95° F. It is seldom sold in the bazar but is used for private consumption. It is suitable for the manufacture of candles. In Kanára candles and soap are made from the oil of this species (*Bomb Gas XV 63*). The crushed seeds of this and of the preceding species after separation of the oil are baked into cakes and sold as a detergent, these cakes are largely used for washing the hair.

Medicine—The PLANT has astringent and emollient properties assigned to it. The LEAVES the BARK and the JUICE of the bark and of the young FRUIT are used medicinally. As with *B latifolia*, this species yields two important products—a fixed concrete OIL and a SPIRIT the former obtained by expression of the SEEDS the latter by distillation of the FLOWERS. The oil is said to be good for skin diseases owing to the rapidity with which it becomes rancid it is not of much pharmaceutical value in the plains of India. The flowers are said to act as a mild laxative (*Mysore Catalogue*).

Food—The economic uses of this tree in the South are similar to those of *B latifolia* in the central table-land of India.

Structure of the Wood—Heartwood red moderately hard close grained. Weight 61 lbs per cubic foot.

Beddome says it is very flexible and durable. is valued for ships keels for trenails and for planking below the water line and that it is used for carts furniture and bridges. **Oleghorn** says the wood is good for trenails. it is comparatively free from the attacks of the *Teredo navalis*. it is procurable among the logs brought down the Godavari. It is valued for all purposes in situations where it is not exposed to air as planking of ships below the water line frames on which well walls are built &c.

Bassia malabarica, Bedd Fl Br Ind III, 544

Habitat—A middle-sized tree native of South Kanara Malabar and the Anamallays up to 4,000 feet abundant (*Beddome*).

Botanic Diagnosis—Branchlets glabrous leaves lanceolate or oblong obtuse or scarcely acute glabrescent distinctly nerved stamens 16 in 2 series subsessile connective excurrent lanceolate linear young fruit oblong lanceolate glabrous.

A very nearly allied species to the Ceylon *B neriifolia*, *Moon*.

Bassia Mottleyana, DeVriese Fl Br Ind, III 546**Gutta percha.**
281

A tree met with in Malacca and Borneo known as *Kotian* and said to yield a copious milky juice, which hardens into a kind of Gutta percha which see.

B Parkii, Don**Shea Butter**
282

A tropical West African tree yields a fat known in commerce as the (alam or Shea Butter. This substance was first described by Mungo Park.

BASSORA.**283**

Bassora Gum.—A group of high-coloured gums resembling traga canth, but very inferior the colour being most objectionable. These are collectively known in commerce as Bassora gum because the gum of this class which first attracted attention is supposed to have been exported from Bassora. they are also sometimes called Hog tragacanth or Hog gums. In India they are collectively known under the generic name *kattira*.

A gum exported from Calcutta to America, and which in America

Bassora Gum.

BASSORA.

received the name of "Gum-Hogg," has recently attracted considerable attention, as it has been found very useful in marbling paper and the edges of books. This seems to be the gum of *Cochlospermum Gossypium*. An analysis of it has appeared in several publications. It is not soluble in water but instead swells into a soft transparent mass. The filtrate after removal of this mass gives a faint precipitate with solutions of subacetate of lead but no reaction with oxalate of ammonia. It is neutral and has neither taste nor smell. Alcohol and ether have no solvent action on the insoluble transparent mass but this is soon dissolved on being boiled with dilute sulphuric acid the resulting solution showing no reaction with tincture of iodine nor with Trommer's test for sugar. When boiled with a weak solution of an alkali or alkaline carbonate it is found to be speedily converted into a uniform thick mucilage of a pinkish colour. On this alkaline solution being neutralised with an acid, it is found to remain soluble while it has lost its objectionable colour.

These are the main characteristics of the so-called Bassora gums which may be distinguished from the Tragacanth series by the following characters. Tragacanth is only slightly soluble in water but owing to its wonderful affinity for water it will absorb as much as fifty times its weight swelling into a thick mucilage. The filtrate obtained on separating this mucilage will be found to yield an abundant precipitate with acetate of lead and to mix clearly with a concentrated solution of ferric chloride or of borax in these respects differing from solution of gum arabic. On the other hand, it agrees with the latter in that it is thrown down as a transparent jelly by alcohol and rendered turbid by oxalate of ammonium. Tragacanth is readily soluble in alkaline liquids even in ammonia water and at the same time it assumes a yellow colour (*Fluck and Hanb's Pharmacog*). The mucilaginous mass is tinged blue on addition of a little of the test solution of iodine. This constitutes a convenient reaction to distinguish Tragacanthin from Bussorin the latter remaining unaffected by the iodine. Chemically *Tragacanthin* and *Bussorin* are in all probability identical being represented by the formula $C_{12}H_{20}O_{10}$. The blue reaction appears to be due to the presence of a small proportion of starch held mechanically by the Tragacanthin. This blue reaction with iodine on the mucilage and the immediate turbidity of the filtrate with oxalate of ammonium are the most characteristic tests for tragacanth. Giraud views the presence of a pectic principle as the most characteristic chemical feature of tragacanth.

The India Bassora gums or Hog-gums are as follow —

(a) *Pale coloured*

1 *Cochlospermum Gossypium*.—This is the *kumbi* or *gabdi* of Hindustan. The tree is very abundant in the forests of the North-West Himalaya extending across the central table-land of India to the west coast and to Prome in Burma. This seems to be the Gum Hogg referred to as exported from Calcutta to America, in which a future trade seems possible to spring into existence.

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2 *Sterculia urens*.—This is the *gūhu* or *gular* and *kūrf* of Hind and *odla* of Assam. A common tree in the sub-Himalayan tracts from the Ganges eastward. This is certainly one of the best of Indian Bassora gums and various reports have from time to time been obtained regarding it. Samples were sent from Chanda in 1873 to London one broker reporting that it was worth 20s a cwt. Samples were also sent from Haiderabad and valued at 30s to 45s a cwt.

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3. Other species of *Sterculia* yield gums identical with the above.

4 *Saccopetalum tomentosum*,—said to yield a clear gum tragacanth.

286

(b) *Dark coloured*

These are decidedly inferior to those mentioned in group (a)

BASSORA.

Bassora Gum.

- 287 1 *Moringa pterygosperma*.—This is the Horse-radish tree of Bengal or *sajna*. It yields an abundance of dark-coloured Bassora gum which rapidly decays into a black powder. This is one of the gums often called *mochá rás* and also false tragacanth or gum hog of European writers.
- 288 2 *Bombax malabaricum*.—This is the *sémul* or red silk cotton tree. It yields *mochá rás* a gum which is often declared as gum hog. It is superior to the last mentioned but of little or no commercial value.
- 289 3 *Allanthus excelsa*.—This is the *maharukh* of Hind and Mar. This much resembles moringa gum but occurs in deep dark red large rounded tears instead of masses.
- 290 4 *Stereospermum suaveolens*.—The *páral* or *párlu*. A tree of the Sub-Himálayan tracts. It yields a dark coloured massive gum of the Bassora series of which very little is known as it rarely occurs in the bazars.
- 291 To this list may be added the gum of *Odina Wodier*, for although this appears to be a soluble and not a bassora gum it is perhaps one of the gums most abundantly pressed on the market either as an adulterant for gum arabic or as a substitute for bassora and tragacanth. Perhaps no tree yields, in Bengal at least a larger supply of gum than this and although it is not so plentiful as *Moringa pterygosperma*, the gum is more frequently met with in bazars than almost any other gums. But for the fact that it is mixed with whitewash for walls it may be said to be worth less as far as has yet been discovered and it is mentioned in this place mainly as a caution since there seems little doubt but that it is one of the principal substances used to adulterate more valuable gums.
- 292 European Gums generally known as Gum hog.—The gum which chiefly goes by this name is obtained from *Symphonia globulifera*, a member of the Gamboge family and a native of the West Indies and of America. This is said to have received its name from the hogs being in Jamaica observed to rub themselves on the gum as it issues from the tree. By many writers the gum from the almond tree is also spoken of as gum hog and there are reports of a considerable trade between Persia and Bombay in a gum presumed to be obtained from that tree. Much confusion prevails however regarding the gums derived from the genus *Prunus*. One feels disposed to assume that the character of the gums of all the species of that genus would be more or less alike and yet the greatest confliction exists in the literature of this subject. The Persian gum hog Dr Dymock says is a cheap substitute for more soluble gums. From this remark one would be almost justified in assuming that it was a soluble and not an insoluble gum and had therefore been incorrectly called gum hog. Stewart and Baden Powell say that apricot gum is soluble and while Dr Cook does not allude to cherry and almond gum he places all the other gums obtained from the genus *Prunus* among his true gums and not in the tragacanth series. Cherry gum has however been carefully examined and pronounced to be much more nearly related to tragacanth and bassora than to the true gums. John detected in it a principle very similar to *bassorin* but Berzelius places this as a mucilage nearer the mucilages from flax seed and quince seed than the gelatinous mass obtained by saturating tragacanth or bassora gum in water. Giraud has carefully examined this mucilage and states that it differs from tragacanthin in the absence of a pectic principle and he further adds that it contains as much as 20 per cent of cellulose. In most countries there are three or four trees which yield gums of the Bassora series. Those met with in India have already been discussed and in European commerce the gum of *Symphonia globulifera* and the gum of the almond tree are those generally met with.

This comparative account of the bassora or gum hog substances with the tragacanth gums may be concluded by recapitulating briefly (what will

The Snake Climber

BAUHINIA
anguina.

be found gone into at greater detail under *Acacia Senegal*) the accepted theory of the chemical nature of the true gums and of the bassora and tragacanth gums. The former are now viewed as compounds formed by an organic acid by union with an alkali obtained on the organic acid percolating through the cell wall. The latter on the other hand are much more nearly related to cellulose. In fact according to Von Mohl confirmed by Wigand, they are metamorphoses of cellular tissue; hence their chemical relation to cellulose.

Gum Tragacanth is imported into India and may be had in every bazar. It is obtained from one or two species of *Astragalus* a genus of Leguminosæ of which we have many representatives on the temperate Himalaya, none of which appear to yield tragacanth. For further information see *Tragacanth*.

Bassorine, see *Orchis mascula*, L. ORCHIDÆ

BATATAS, Choisy Gen Pl II 872

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A group of CONVOLVULACEÆ now reduced to *IPOMÆA*

Batatas edulis, Choisy see *Ipomœa Batatas*, Lamk.; and

B. paniculata, Choisy see *Ipomœa digitata* Linn. CONVOLVULACEÆ

BAUHINIA, Linn Gen Pl I 572

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A genus of arborescent or scandent plants belonging to the LEGUMINOSÆ in the Sub-Order CÆSALPINIÆ and comprising some 130 species diffused throughout the tropics.

Unarmed plants with simple usually deeply cleft leaves rarely entire or bijugate. *Flowers* showy in copious simple or paniced often corymbose racemes. *Calyx* tube with the disk produced to the top sometimes long and cylindrical sometimes short and turbinate; limb entire and spathaceous or cleft into 2-5 teeth. *Petals* 5 sub-equal usually with a distinct claw. *Stamens* 10 or reduced to 5 or 3 if fewer than 10 with sterile filaments absent or present filaments free filiform anthers versatile dehiscing longitudinally. *Ovary* stalked many-ovuled style long or short stigma small or large and peltate subterminal or oblique. *Pod* linear or rarely oblong flat continuous within dehiscent or indehiscent. *Seeds* albuminous.

The generic name was given in honour of the botanists John and Oaspar Bauhin the brothers being commemorated by the two-lobed nature of the leaves.

Bauhinia acuminata, Linn Fl Br Ind II, 276

295

Vern—Káncan BENG *Kachnár kachnái* HIND DUK *Káncana kánsana* (variety) TEL *Mahahlega byu* BURM

Habitat.—An erect shrub with elegant white flowers met with in the North West Provinces Bengal Burma South India and Ceylon.

Botanic Diagnosis.—Flowers in close axillary racemes petals as long as the calyx limb which is cleft into 5 subulate teeth at the tip pod with a rib on each side of the upper structure.

This species and also *B. tomentosa*, belongs to the section PAULETIA. Erect shrubs or small trees with large showy flowers and connate leaflets. *Stamens* 10 all fertile. *Calyx* with a very short tube and spathaceous limb. *Pod* narrow dehiscent.

Oil.—Mentioned as an oil yielding plant in *Spons' Encyclopædia*.

B. anguina, Roxb.; Fl Br Ind II, 284

OIL

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THE SNAKE CLIMBER

Vern.—*Nag-pát* SYLHET; *Nawulí*, NEPAL *Suhatárungruk* L.

**BAUHINIA
malabarica.****Bauhinia.**

FIBRE
208
TIMBER
200
DOMESTIC
Serpent
charms
300
301

Habitat.—A climber of North and East Bengal Sikkim Chittagong Martaban Burma and South India It also occurs on the Western Peninsula and is distributed to the Malay

Botanic Diagnosis.—Fertile stamens 3 Calyx tube scarcely any Flowers minute in copiously paniced racemes A climbing shrub with copious circinnate tendrils having the stem bent upon it elf in a remarkable manner alternately concave

Properties and Uses.—

Fibre.—Its bark is used in rope making

Structure of the Wood.—Soft and porous The stems are bent generally in alternate folds and with a straight thick margin

Domestic Uses.— The most regularly serpentine pieces of the stems and large branches are carried about by our numerous mendicants to keep off serpents (*Roxb, Fl Ind Ed C.B.C. 347*)

Bauhinia macrostachya, Wall Fl. Br Ind, II 281

Syn.—*B. scandens* *Roxb Fl Ind, Ed C.B.C. 346 Wight, Ic t 264 non Linn*

Vern.—*Gunda gulla* BENG

Habitat.—An extensive climber, found in the forests of Sylhet and Assam

Botanic Diagnosis.—A cirrhose plant. Leaves 9-nerved pubescence thin grey pedicels moderately long calyx tube turbinate very oblique sepals deltoid petals much exerted

This belongs to the section PHANERA or erect or scandent species with usually 3 or sometimes 4 5 stamens Calyx tube mostly produced limb usually 5-cleft sometimes spathaceous The following species belong amongst others to this section *B. ornata, Kurz B. purpurea, Linn B. retusa, Ham B. Vahlia, W & A* and *B. variegata, Linn*

Properties and Uses.—

Fibre.—The BARK yields a strong fibre The line made from the fibre sent by Major Jenkins sustained for forty five minutes 168 lbs having stretched six inches only in three feet and therefore is about the same strength with our best *sun* hemp But whether from the mode of preparation or the nature of the material it is so harsh and stubborn and the fibres stick so close together that the heckles tear it to pieces and injure its strength (*Royle's Fibrous Plants of India p 297*)

At the Panjáb Exhibition there was a sample from the foot of the Kangra Hills where it is described as used to make ropes for bedding and the bark which burns or smoulders slowly is used for a slow match (*Baden Powell Panjáb Products I 510*)

Slow match
303

304

B. malabarica, Roxb, Fl Br Ind II, 277 Brandis, 159

Vern.—*Amlí amlósa* HIND *Karmá* BENG *Gourubati, URIYA Laba* KOL *Amlí takí* NEPAL; *Kattra* ASS *Cheppura, basavana páda* KAN *Korala* MAR *Kundapula dhondel kangali* GOND *Ambotha, chapa* KURKU, *Pulla dondur puli shinta pulhari,* TEL *Cheppuru* KAN *Apta* BERAR *Bwaygyin bwéchin* BURM (*Amlí* is also the HIND and DUK name for *Tamarindus indica.*)

Habitat.—A moderate-sized bushy deciduous tree, met with in the Sub-Himálayan tract (Kumaon, 1 000 feet in alitude and ascending to 4 000 feet in Behar) from the Ganges to Assam, in Bengal, Burma, and South India

Botanic Diagnosis.—Leaves 7 to 9-nerved, slightly cordate deeply bifid flowers in short, mostly simple corymbs bracts minute, lower pedicels 1½-2 times the calyx, calyx limb 5-cleft, style produced.

B. 304

Bauhinia.**BAUHINIA
purpurea.**

This, as also *B. racemosa*, belongs to the section *PILKOSTIGMA*. Erect shrubs or climbers with small flowers and connate leaflets. Fertile stamens 10 calyx with a short tube and spathaceous or 5-cleft limb. Pod narrow indehiscent.

Properties and Uses—

Food—The leaves are very acrid, but are eaten by people in Burma (*Brandis*)

The young shoots which appear just before the rains are used as a vegetable in the Konkan when cooked they are slightly bitter but very palatable (*Dymock*)

§ *Korala* *MAR*—The tender leaves are eaten as a vegetable. They are not believed to be acrid in the tender state. The name *Aml* is in Bombay applied to *Tamarindus indica* and not to *Bauhinia malabarica*. (*Assistant Surgeon Sakharām Arjūn Ravat Bombay*)

Structure of the Wood—Light reddish brown with irregular masses of black or purplish wood near the centre moderately hard. Numerous narrow wavy white concentric bands of softer tissue alternate with bands of harder and red coloured wood of equal width in which the numerous fine uniform and equi distant medullary rays are distinctly visible. Weight about 48 lbs per cubic foot.

It is rarely used.

Bauhinia ornata, Kurz Fl Br Ind II, 281

Vern—*Myaukkelga* *BURM*

Habitat—Pegu

Botanic Diagnosis—An elegant species clothed with deciduous, bright ferruginous silky pubescence. Leaves 9-11 nerved pedicels long flowers small calyx tube short turbinate sepals 5 rather exceeding the tube petals slightly exserted.

B purpurea, Linn Fl Br Ind I 284 Brandis, For Fl, 160

Vern—*Korral, karār karallī* *gray PB* *Kohār kahār hanār handan* *khairwal khillar kōlārī sonā HIND* *Khawarālō NEPAL*; *Kachik* *LEPCHA* *Deva kancha: rakta kanchan korral, BENG* *Burujū, KOL*; *Kōnar LOHARDUGGA* *Singyara SANTAL* *Kundrow MAL (S P)*; *Kodwarī GOND* *Kohārī KURKU* *Rakta chandan atmattī rakta kanchan deva kanchana MAR* *Punya āre mandareh TAM*; *Kan chan(?) pedda āre bōdantā chettu TEL*; *Sarūl surūl kanchivēla KAN* *Kānchan SANS* *Makalay kani mahahlegani BURM*

Habitat—A moderate-sized deciduous tree of the Sub-Himālayan tract, from the Indus eastward Central and South India and Burma.

Botanic Diagnosis—Leaves 9-11 nerved pubescent grey pedicels short sepals not fully distinct exceeding the turbinate tube petals oblanceolate glabrous exserted.

Properties and Uses—

Gum—Yields a gum called *Sem kī gōnd*

Dye—The bark is used for dyeing and tanning.

Fibre—A fibre may be prepared from the bark.

Medicine—The BARK of this plant is astringent the ROOT carminative, and the FLOWERS laxative.

§ A decoction of the astringent bark is recommended as a useful wash in ulcers (*Civil Medical Officer U C Dutt Serampore*) "Bark acts as an astringent in diarrhoea the flowers are laxative, the roots tonic" (*Surgeon W Barren Bhuj, Cutch*)

Food—Dr Stewart says that the FLOWERS are used as a pot herb in curries, and that they are also made into pickles, the leaves are given to cattle as fodder.

FOOD
305

TIMBER
306

307

308

GUM
309
DYE & TAN
310
FIBRE
311
MEDICINE.
Bark
312
Root.
313
Flowers.
314
FOOD
Flowers
315
FOODER
Leaves
316

**BAUHINIA
racemosa.****Bauhinia.****TIMBER
317**

Structure of the Wood—Pinkish white turning dark brown on exposure moderately hard Weight 40 to 50 lbs per cubic foot
Used for agricultural implements and in construction

318

Bauhinia racemosa, Lam; Fl Br Ind, II, 276 Gamble Man Timb 139

Syn—*B. PARVIFLORA Vahl Roxb Fl Ind II 323*

Vern—*Kachnal gurial thaur ashta makkuna maula dhorira marvil ghila* HIND *Banraj banraji* BENG *Kaimu KOL Gatoni* ORAOB *Katmanli* KHARWAR and LOHARDUGGA *Beriju* SANTAI *Ambru* MAL (S P) *Ambhota* URIVA, *Ashta Makkuna* OUDH *Mahauli* BANDA *Maula Dhorira* C P *Kosundra taur* PB *Dhondri dhundera a tra bosha* GOND *ghinja* AJMER *Amba bhosa* BHIL *Bossai* KURKU *Are ka-ghar* DUK *Ati (?) archi (?) areka are maram* TAM *Ari dre, adda* TEL *Apta apata kanriya seyara* MAR *Apta* THANA *Asindro asindri asotri* PANCH MAHALS *Aupta* KAN *Svetakanchan* SANS *Hpalan palan* BURM

Habitat—A small crooked deciduous tree met with in the Sub Himālayan tract from the Ravi eastwards ascending to 5000 feet in Oudh Bengal Burma and Central and South India. Distributed to China the Malay isles and Timor

Botanic Diagnosis—Leaves small deeply cleft 7-9-nerved flowers in lax simple racemes calyx limb entire stigma sessile

Properties and Uses—**GUM**

Gum—It yields a gum of which little is at present known

**310
FIBRE
320**

Fibre—A strong fibre is made from the inner bark used for cordage but is not durable in water It yields a good bast

Specimens were shown at the late Calcutta International Exhibition from various parts of India notably from Salem District Madras May this not be the undetermined bast fibre described by Royle under the name of *Asta patu* sent from Bīrbhum to the Exhibition of 1851?

§ Used here for making country ropes leaves used for making cigarettes (Surgeon Major W Dymock Bombay)

MEDICINE**Gum**

Medicine—The GUM of this plant is used medicinally in South India (T L Stewart)

321

§ A decoction of the leaves is used to relieve headache in malarious fevers (Surgeon Major W Dymock Bombay)

Leaves

Food—The seeds are eaten by the people in some parts of the country In parts of Northern India the leaves are eaten by buffaloes

322**FOOD****Seeds**

§ The leaves are pickled by the Burmese (J C Hardinge Esq Rangoon)

323**Leaves****324****FODDER****Leaves****325****TIMBER****326****DOMESTIC****Cigarette****Covers****Leaves****327****Slow match****328****Sacred plant****329**

Structure of the Wood—Light brown hard with irregularly shaped masses of darker coloured and harder wood near the centre Weight 40 to 56 lbs per cubic foot. The wood is strong and close-grained. (Bomb Gas XVII 63)

Good but not used owing to the plant never growing big enough It is sometimes burned as firewood

Domestic Uses—The leaves are made into cigarette covers in the Panch Mahāls Gujarāt. These are in Thāna called *bidis* In Thāna alone the right to pluck the leaves used as *bidis* fetches an annual rent of ₹1500 The leaves of *Diospyros melanoxylon* are also used for the same purpose The trade in *bidis* in Khāndesh is small. Match lockmen make their matches of the bark of this tree it burns long and slowly without the help of saltpetre or any other combustible To prepare the bark it is boiled, dried, and beaten. (Roxb, Fl Ind Ed C B C p 345)

"A sacred plant of the Hindūs worshipped on the Dasera festival" (Bomb Gas X 401)

Bauhinia.

BAUHINIA
tomentosa.**Bauhinia retusa**, Ham *Fl Br Ind II* 279; *Gamble*, 161

330

Syn.—*B. EMARGINATA* Wall *PHANERA RETUSA* Benth.Vern.—*Kural* PB *Kandla* *kanalla* *kuayral* *gwayral*, *kanlao* *semia*HIND *Laba* KOL *Twar* ORAOON *Katman* KHARWAR; *Thaur*GOND *Kaimu* LOHARDUGGA; *Twar* PALAMAU; *Nirpa* TEL**Habitat**—A moderate-sized deciduous tree of the North West Himá laya from the Beas eastward ascending to 4500 feet Simla Garhwál Kumaon and Central India.**Botanic Diagnosis**—Leaves rigidly coriaceous rather broader than long 1-6 inches long 9-nerved glabrous beneath usually deeply cordate calyx tube turbinate very short*Properties and Uses*—**Gum**—It yields a clear gum called *Semla gond* almost exactly resembling gum arabic It is eaten by the poorer classes and is used to water proof terraced roofs Roxburgh says From wounds made in the bark a brownish mild gum is produced It is used as a medicine either alone or in combination with other medicines The annual export from Dehra Dun is about 2500 maunds§ Is used as an external application to sores It is considered as an emmenagogue and diuretic by some native practitioners (*Surgeon G A Emerson Calcutta*)**Structure of the Wood**—Reddish white with irregularly shaped darker masses near the centre hard Weight 58 lbs per cubic foot

Not used

GUM

331

MEDICINE

332

TIMBER

333

B scandens, Roxb syn for **B macrostachya**, Wall**B tomentosa**, Linn *Fl Br Ind II*, 275 *Roxb*, *Fl Ind*, Ed C B C 345

334

Vern.—*Kachnár* HIND *Asundro* GUJ *Chámál*, KONKAN; *Pwólakún* *chan apt** MAR *Kanchini* TAM TEL *Usamaduga* MADRAS *Maha hlæ-ga-wa* BURM *Kaha-pettang* SINGH The vernacular names *kachnár* *kachnál*, and *kánchan* or *kánchini* are applied to more than one species of *Bauhinia* (*Moodeen Sheriff*)**Habitat**—North West Provinces and throughout India to Ceylon and Penang Distributed to China and tropical Africa**Botanic Diagnosis**—An erect shrub with downy branches Flowers usually in axillary pairs petals much longer than the entire calyx limb pod stalked not ribbed near the upper suture*Properties and Uses*—**Fibre**—From the bark a fibre is prepared**Oil**—Balfour simply mentions this plant among his oils without describing it**Medicine**—As a medicine the plant is antidyseric anthelmintic and useful in liver complaints Ainslie says that the dried buds and young flowers are prescribed in dysenteric affections According to *Rheede* the decoction of the root bark is useful in inflammation of the liver (*Dymock Mat Med W Ind* 224)§ Applied locally in aphthæ The fruit is diuretic, an infusion of the bark is used as an astringent gargle The seeds made into a paste with vinegar are said to be efficacious as a local application to wounds inflicted by poisonous animals (*Surgeon G A. Emerson Calcutta*)Hakeems administer the dried leaves and young flowers in dysenteric affections A decoction of the bark of the root is used in cases of liver also as a vermifuge (*Surgeon H W Hill Mánbhm*)**Structure of the Wood**—Tough close-grained with a black heart wood, when full grown it is very soft

FIBRE

335

OIL

336

MEDICINE

Flowers

337

Fruit

338

Seed.

339

Bark.

340

TIMBER.

341

B 341

BAUHINIA
Vahl.**Bauhinia.****342****Bauhinia Vahl., W & A, Fl Br Ind, II, 279.****Syn.**—*B. RACEMOSA* Vahl; Roxb, Fl Ind Ed C.B.C 346**Vern**—*Malghán malán malá, mauram, jallaur or jallur* HIND
Chehur BENG *Sihár mahalan mauí* C. P. *Borla* NEPAL *Sungung*
rik LEPCHA *Yom* SANTAL *Lama rung* KOL *Shols* URIVA;
Maulan KHARWAR *Taur* PB *Chambolli* DUK *Chambura chambuli*
chárbor MAR *Paur bela* GOND *Adda* TEL**Habitat**—This is one of the most extensive, as it is the most abundant and most useful of Indian climbing Bauhinias. It is found all along the lower Himalaya (ascending in Kumaon and on Paresnath in Behar to 2 500 feet) from the Chenab eastward, North and Central India, and Tenasserim.**Botanic Diagnosis**—Tendrils strong woody pubescence dense grey or ferruginous leaf lobes obtuse pedicels long calyx tube cylindrical petals much exerted densely pilose**Properties and Uses**—**Gum**—Yields a copious gum which seems to be of little use**Fibre**—The uses of this climber are perhaps more numerous than those of any other forest plant the strong cordage prepared from its BARK is an important article with the hill tribes. Specimens of this fibre were exhibited at the London Exhibition of 1851 under the name of *Patwa* or *mawal*. A large collection of strong red rope made from it were also displayed at the late Calcutta International Exhibition. In the Kew Report for 1879 it is stated that a sample of this fibre was submitted by Sir J. D. Hooker to Mr. Routledge of the Ford Paper Works Sunderland who reports as follows. Excellent strong fibre hemp character and tough. Green yield 60 per cent bleached 54.7 per cent. Capt. Hudson in his Report on Hemp in Garhwál 1840 gives the following facts.The *malloo* is a large creeper forty or fifty yards in length and of considerable thickness from the bark of which a very strong rope is made. The natives chiefly use it for tying up their cattle and sewing their straw mats with the fresh bark it also makes capital matches for guns and muzzles for oxen and calves. It is cut generally in July and August though it may be cut all seasons and the outer bark being stripped off is thrown away the inner coating being used for ropes as wanted by being previously soaked in water and twisted when wet. A large creeper will produce a maund of fibre called *seloo*. The bark before being used is boiled and beaten with mallets which renders it soft and pliable for being made into ropes and string for *charpoys*. Though this fibre makes very strong ropes it is not over durable and rots if kept constantly in water it will last about 18 months but requires occasional soaking and I am informed that when coated with tar it does not last much longer. The fibre is not collected for sale but only for the natives own use as they may require it but any quantity, I imagine, might be obtained and at cheap rates.Royle, in his *Himalayan Botany* and also in his *Fibrous Plants of India* gives an account of this fibre, quoting the above extract. No additional information has since appeared, and the fibre is still unknown to the European industries.**Medicine**—The SEEDS are said to possess tonic and aphrodisiac properties. The LEAVES are regarded as demulcent and mucilaginous remedies.**Food**—The SEEDS are eaten raw when ripe they taste like cashew nuts (Roxb, Fl Ind Ed C.B.C p 346). They are also eaten fried. The young PODS are cooked and eaten by the hill tribes. The seeds taken from the huge pods of *B. racemosa* are eaten in the hills. The

GUM

343

FIBRE

Bark

344

Ropes

345

MEDICINE

Seeds.

346

Leaves.

347

FOOD

Seeds.

348

Pods.

349

B 349

Bauhinia.**BAUHINIA
variegata.**

Pods look like pieces of thick undressed leather, about a foot long and an inch or two broad they are placed over the ashes of a fire till they roast and split open the flat soft seeds are taken out and eaten the flavour is pleasant but the seed is not wholesome (*Baden Powell's Panjab Products Vol I p 265*)

Structure of the Wood—Porous, in broad irregularly-broken concentric layers alternating with red juicy bark like tissue the pith is cross-shaped The foliage is very dense and the stems do great damage to the trees they climb over it is very prevalent in *sal* forests and in many provinces is being systematically exterminated

Domestic Uses—In the *Kew Report for 1881* it is stated that the leaves of this plant and not those of *Cochlospermum Gossypium* are those used in the construction of the crude leaf bellows in Sikkim They are sewn together and used as plates cups rough table-cloths umbrellas and rain-hats and caps The leaves which are heart shaped and above a span in breadth and the same in length are made into chattas (umbrellas) are sewed together with twigs into baskets for holding pepper turmeric and ginger and are brought to Sreenuggur in great quantities for sale being used by the poor instead of dishes to eat off and the *buneeahs* wrap up their goods with them A load of the leaves fetches about 2 annas (*Capt Huddleston's Report on Hemp in Garhwal 1840*) In Chutia Nagpur the Santals cut off the dry loops of tendrils (those which have failed to catch any object) and make with these finger rings worn as a charm against dropsy (*Rev A Campbell*)

Bauhinia variegata, Linn , Fl Br Ind, II, 284

Vern.—*Kachnar kolar kurd padrisn khwasraal gurid gmar barial kaniar kandan khairwal*, HIND *Rakta kanchan* BENG *Kurmang* MECHI *Singya* KOL *Kundol* BHUMIJ; *Singya* SANTAL *Tahi* NEPAL *Rha* LEPCHA *Kachnar* C P *Kanchan ragtakhanchan* MAR *Kanchan* KONKAN *Kovidara*, BOMB *Segapu-munthari* TAM; *Kanchivala-do* KAN *Borara* URIYA *Bwaycheng bowchin* BURM

Habitat—A moderate-sized deciduous tree found in the Sub-Himalayan tract from the Indus eastward and throughout the forests of India and Burma Common everywhere ascending to 4000 feet in altitude preferring the low hills of India but largely cultivated as an ornamental tree throughout the plains Often completely covered with large purple and white flowers which appear in the beginning of the hot season

Botanic Diagnosis—Leaves 9-11 nerved pubescence grey pedicels short calyx limb entire spathaceous equalling the cylindrical tube, petals glabrous-obovate clawed much exserted.

Closely allied to *B purpurea*.

Properties and Uses—

Gum.—This tree, like most other members of the genus, yields the gum known as *Sem* or *Semla gond* It is a brown-coloured gum *Sem-kigond* is in fact, a sort of generic name for the gum obtained from the species of *Bauhinia* It swells in water like cherry tree gum, a very small proportion only being soluble

Dye—The bark is used in dyeing and tanning (*Bomb Gas*, XV, Part I 64.)

§ "The bark is used by dyers in Madras." (*Deputy Surgeon-General G Bidie C I E Madras*)

Oil—The seeds are said to yield an oil.

Medicine.—The root in decoction is given in dyspepsia and flatulency the flowers with sugar as a gentle laxative, and the bark flowers, or root, triturated in rice-water, as a CATAPLASM to promote suppuration

TIMBER.
350

DOMESTIC
Leaf bellows.
351
Plates.
352
Cups.
353
Umbrellas.
354
Rain hats.
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356

GUM.
357
DYE & TAN
Bark
358
Oil.
359
MEDICINE.
Flowers.
360
Roots.
361
Cataplasm.
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BEADS.

Natural Objects used as

Bark.

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Buds.

364

FOOD

Seeds

365

Buds

366

TIMBER

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The BARK is described as alterative tonic and astringent, useful in scrofula, skin diseases and ulcers. It is also used to remove intestinal worms and to prevent the decomposition of the blood and humours on this account it is useful in leprosy and scrofula. The DRIED BUDS are used as a remedy for piles and dysentery. They are considered by natives cool and astringent and are useful in diarrhoea and worms (*Baden Powell's Pb Prod I, 344*).

Food—It flowers in February March the seeds ripen two months later. The buds are eaten as vegetables when prepared with animal food (*Drury*).

Structure of the Wood—Grey moderately hard with irregular masses of darker and harder wood in the centre. Hard and serviceable but seldom used owing to the small size. Weight 40 to 50 lbs. Used for agricultural implements.

Sacred and Domestic Uses—Often seen on Buddhistic sculptures.

SACRED

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BDELLIUM

Bdellium, a myrrh like resin of which there are three kinds —

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1st—*Indian* the produce of **Balsamodendron Mukul**, *Hook* met with in Sind Rajputana Khándesh Berar Beluchistan and Arabia. This substance is also obtained from **B Roxburghii**, and in Beluchistan from **B pubescens**. *Mukul* or *Gugul* (Indian Bdellium) from Coromandel is the produce of **Boswellia glabra**, and that from the Western Himalaya is the produce of **Boswellia serrata**.

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2nd—*African Bdellium*. This is now believed to be the produce of **Hemprichia erythraea**, *Ehrenb* (a synonym for **Balsamodendron Katsaf**, *Kunth*). This substance to a certain extent resembles Myrrh but is of a darker colour. It is twice the price of the Indian Bdellium. Both this and the preceding are given to buffaloes to increase their milk.

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3rd—*The Opaque Bdellium*. This is the produce of **Balsamodendron Playfairii**, *Hook* which see.

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BEADS

Beads—Articles of personal ornament (and chiefly natural objects used for this purpose) may be enumerated under the above heading. They are Beads Rosaries Garlands Necklaces Earrings &c and may be classed —

1st *Those which belong to the Mineral Kingdom* such as glass and stone beads used by the mass of the people (i.e. not including those which would be pronounced as jewels) alabaster metal ornaments &c

2nd *Animal Kingdom*—Coral pearls of the cheaper kind ivory shells fish and other bones feathers skins &c

3rd *Vegetable Kingdom*—Flowers fruits seeds specially prepared pieces of wood or other natural botanical structures

A complete list of the objects used for the above purposes would be highly interesting and instructive. But such a list may be viewed as having an ethnological rather than an economic interest and would therefore be somewhat out of place in the present publication. The subject is however replete with interest, and as a considerable trade is done in certain articles which must be enumerated here it has been thought desirable to give the leading facts which can be collected together in a limited space. It is hoped that at least one object may be served by the publication of even an incomplete list of this nature,—namely, the creation of an

Personal Ornaments

BEADS.

interest in a subject which the advances of civilization are certain to obscure more and more every day. The first attempts made by savage races at clothing and adornment were most probably decoration by means of natural objects. A careful study of the shells bones seeds fruits and flowers used for this purpose by aboriginal tribes at the present day would throw a flood of light upon many obscure anthropological subjects destined to be obliterated with the advances of foreign trade in glass beads and cheap European ornaments

I—BEADS AND OTHER ORNAMENTS WHICH BELONG TO THE MINERAL KINGDOM

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GLASS BEADS AND FALSE PEARLS

An enquiry was instituted into this subject on the suggestion of the Government of India in the Department of Revenue and Agriculture. Mr W J Wilson published a report in February 1883 of considerable interest. He divided glass beads into two primary sections (a) those imported into India and China and (b) those manufactured in India. Of the former he established seven sections

(a) FOREIGN BEADS

1st Pound Beads—These are made chiefly in Venice. The glass is drawn into tubes cut into small pieces and by means of sand the edges are rounded off and polished. There are said to be 20 standard sizes of pound beads of all colours. Black is the favourite colour but in Rajputana light blue is in great demand. Red blue amber pink and white are also used. The smaller sizes are in the greatest demand.

They are used for a variety of purposes. The larger ones are made into necklaces wristlets and rosaries while the smaller are employed in the decoration of shoes hookah stems toys lac bangles carpets &c

2nd Seed Beads—These are smaller than the preceding

3rd Broken Beads—These are like pound beads only longer and the ends not rounded off

4th Pigeon egg Beads—These are about one inch in length and five eighths of an inch in diameter. They are chiefly used to decorate horses and cattle

5th Cut glass Beads—These are met with chiefly in Central India and Sind

6th Spotted Beads—Are in demand in the Central Provinces

7th Round Beads—Are not much used

The following are the imports of beads for the past five years and also an analysis of those for the year 1883-84 showing the countries from which the imports are obtained and the provinces to which imported —

Imports of Beads (Glass) and False Pearls

| YEARS | Quantity in Cwt | Value in Rupees |
|---------|-----------------|-----------------|
| 1879-80 | 13 751 | 8 79,895 |
| 1880-81 | 15 483 | 11 68 060 |
| 1881-82 | 16 724 | 11 84,148 |
| 1882-83 | 19 597 | 12 79 023 |
| 1883-84 | 23,243 | 16,18,728 |

European beads
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BEADS.**Cheap Manufactured Articles used as***Analysis of the Imports for 1883-84*

| Presidency or Province into which imported | Quantity in Cwt | Value in Rupees | Countries whence imported. | Quantity in Cwt | Value in Rupees. |
|--|-----------------|------------------|----------------------------|-----------------|------------------|
| Bengal | 10 029 | 5 05 568 | United Kingdom | 637 | 4 70 970 |
| Bombay | 12 972 | 10 08 231 | Austria | 1 752 | 2 46 993 |
| Sind | 19 | 2 200 | Belgium | 109 | 3 717 |
| Madras | 87 | 15 562 | France | 350 | 77 397 |
| British Burma | 136 | 87 167 | Italy | 17 959 | 7 23 386 |
| | | | Egypt | 18 | 6 285 |
| | | | Ceylon | 566 | 23 787 |
| | | | China—Hongkong | 1 792 | 61 576 |
| | | | Straits Settlements | 40 | 3 101 |
| | | | Other countries | 20 | 1 516 |
| TOTAL | 23 243 | 16 18 728 | TOTAL | 23 243 | 16 18 728 |

The above analysis of the imports shows that Italy is the country which meets the major portion of the Indian demand for glass beads. The imports for the past five years indicate a steady increase those for 1883-84 being very nearly twice as much as for 1879-80.

The beads which come from China to India are chiefly round and vary from a quarter to half an inch in diameter. They are ruby or green coloured and are commonly met with in the Central Provinces and in Rájputana.

(b) MANUFACTURED IN INDIA

Indian glass beads are said to be manufactured in Kaira and Surat in Bombay, Jaipur and Bundi in Rájputana, Saugor in the Central Provinces, Jaunpur in the North West Provinces and Delhi and Multan in the Panjáb. They are described as of seven kinds—

- (1) Imitations of imported beads
- (2) The Saugor beads—round flat, about a quarter inch in diameter and one eighth to three sixteenths of an inch in length
- (3) Pigeon egg beads made in Kaira.
- (4) Large flat beads made in Kaira.
- (5) Spherical beads made in Surat.
- (6) Small ring beads made at Delhi and Multan
- (7) Flat beads made at Lucknow

No information can be given as to the extent of this Indian industry but it seems probable that old glass is largely used in the manufacture of beads. When made from indigenous materials the beads are always very coarse and badly coloured. The *Káncb* or country glass made from *reh* soil is either green or black. Dr Owen in his Catalogue of the Jeypore articles shown at the Calcutta International Exhibition says "Glass beads as imitations of emeralds, rubies, sapphires, and turquoises are very well made, which are then cut in facets by lapidaries. These latter were once largely exported from Jeypore and engaged several families, but have fallen into the background for some years, as the competition with European made beads was found too strong."

A certain amount of lac beads are regularly made, and in lower Bengal a very large trade exists in glass and lac bangles (see GLASS); the former are generally green or black and the latter are often ornamented by European beads, attached while the lac is still soft.

China beads
375

Indian beads
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Lac beads.
377

| Personal Ornaments. | BEADS. |
|---|-----------------------------|
| <p>(c) STONES ALABASTER, &c</p> <p>A very large trade is done in the cheaper kind of stones These are collected on the mountains of India and Burma, and are also brought across the frontier from the northern Himālaya A considerable trade is done at Simla in beads, necklaces &c The principal stones are turquoise, rubies onyxes cornelians emerald jadestone (false), serpentine agates jaspers marbles &c, &c</p> | <p>Stone beads. 378</p> |
| <p>(d) METAL BEADS</p> <p>Small beads made of various metals are commonly met with the more elegant being gold beads used along with precious stones or coral</p> | <p>Metal beads. 379</p> |
| <p>II—OBJECTS OF ORNAMENT BELONGING TO THE ANIMAL KINGDOM</p> | |
| <p>The most important objects belonging to this section are of course pearls and coral As these will be found discussed in their alphabetical positions it is not necessary to do more than mention them by name in this place Shells are largely used for this purpose none perhaps more extensively than the common</p> | |
| <p>COWRIES</p> <p>These are imported into Bombay chiefly from the Laccadive and Maldive Islands and from Zanzibar From time immemorial they have been used as coins by the Hindus the currency being—</p> <p>4 Cowries = 1 Ganda. 20 Gundas = 1 Pan 16 Pans = 1 Kāhan</p> | <p>Cowries. 380</p> |
| <p>The present rate is 24 gandas or 96 cowries to a pice and 4 pice to an anna and 16 annas to the rupee hence $96 \times 64 = 6144$ cowries to the rupee</p> <p>They are extensively used as articles of adornment for cattle and horses and amongst the hill tribes are also used for personal ornament In the Naga Hills they are cut lengthwise, the back being removed and rejected Cut in this way they are sewn over garments chiefly in rows upon a piece of black cloth worn by the men and forming a sort of kilt Formerly the number of rows of white cowries denoted the deeds of daring committed by the wearer He was permitted to wear one row for his first murder another for the second and another for the third. After that he might wear as many rows as he chose but most preferred the triple line By modern usage however all full grown males wear a black kilt with three rows of cowries (For further information see COWRIE)</p> | |
| <p>THE CONCH OR CHANK SHELLS</p> | |
| <p>These are fished up from deep water by divers in the Gulf of Manaar on the coast opposite Juffnapatam in Ceylon and also from Travancore Tuticorin &c &c</p> <p>A curious trade exists in Dacca in cutting these into rings, armlets &c In the Nagā Hills they are cut up into beads One half the shells are suspended from the back of the neck the point being directed downwards and the remainder are cut up into long pieces or beads forming the front part of the chain The conch is of course extensively used for the horns blown at temples (For further information see CONCH)</p> | <p>Conch. 381</p> |
| <p>A number of small bivalve shells are used as ornaments by the Andaman Islanders, as also bones of various animals, including human bones The reader is referred to an interesting paper regarding these by Professor Allen Thomson, F R S., in the <i>Journ Anthropol Inst</i>, XI, 295</p> | <p>Bones. 382</p> |

| BEADS | Natural Objects used as |
|--|---|
| Feathers. 383 | <p data-bbox="489 245 720 270" style="text-align: center;">FEATHERS SKINS, &c</p> <p data-bbox="253 273 989 609">Feathers of various birds are used as personal ornaments, and also pieces of skins furs &c The available information is however too imperfect to admit of these being gone into in detail The large black and white feathers of the horn bill are much prized by the Angami Nagas and the tail feathers of the wild cock by the Garos The blue and green feathers of a woodpecker are used as ear ornaments by the Angamis The beak of the horn bill is attached to the helmet of the Mishmi chief or head man and bands of bears skin are used in the construction of the helmets worn by many of the Assam tribes Goats and human hair black and dyed red by madder are extensively used by Assam tribes for decorative purposes The boar tusk curving downwards and terminated above by a tuft of red hair is the most fashionable earring amongst certain Nagas just as a bunch of cotton wool 2 or 3 inches in diameter inserted into a greatly dilated ear perforation is admired by others, especially the tribes in North Manipur</p> |
| Hair 384 Teeth and Tusks 385 Cotton wool 386 | <p data-bbox="259 631 983 677" style="text-align: center;">III—BEADS AND OTHER ORNAMENTS WHICH BELONG TO THE VEGETABLE KINGDOM</p> |
| Natural Vegetable beads 387 | <p data-bbox="253 682 989 794">Certain parts of the following plants are used as beads rosaries garlands &c Fuller information will be found in their respective alphabetical positions in this work but the abstract given below may be found useful to persons desirous of studying such objects collectively and from an ethnological point of view</p> <ol style="list-style-type: none"> <li data-bbox="253 794 989 905">1 <i>Abrus precatorius</i> The Crab's eyes or <i>rat's</i> seeds—The fact of this red shining seed with its black eye-spot being used for rosaries suggested the specific name <i>precatorius</i> They are strung together along with shells and black seeds in necklaces and are also largely used in the decoration of boxes baskets &c <li data-bbox="253 905 989 996">2 <i>Adenanthera pavonina</i>, The Red wood or <i>rakta kanchan</i>—The brilliant scarlet seeds of this tree are larger than the preceding flattened and devoid of the black eye spot otherwise they are very much alike They are strung and worn by the women in many parts of India <li data-bbox="253 996 989 1063">3 <i>Adhatoda Vasica</i>, The <i>Baxas</i> of Bengal—The wood of this plant is made into small beads resembling those made from <i>Ægle Marmelos</i>, <i>Cajanus iudicus</i> and <i>Flacourtia Ramontchi</i> <li data-bbox="253 1063 989 1105">4 <i>Ægiceras majus</i>—The pretty white flowers of this shrub are made into garlands on the western coast <li data-bbox="253 1105 989 1172">5 <i>Ægle Marmelos</i>, The <i>Bel</i>—Beads are made from the rind as well as from the wood. Strung with the fibre of <i>Agave americana</i> they are worn by the Sudras to denote that they are not Mohammedans <li data-bbox="253 1172 989 1263">6 <i>Æschynomene aspera</i>, The <i>Sola</i>—Prepared pieces of pith are sometimes worn by the aboriginal tribes as ear ornaments Garlands of beads of the pith or <i>sola</i> coloured and tinselled are used to decorate idols and worn by brides and bridegrooms <li data-bbox="253 1263 989 1305">7 <i>Allium sativum</i>, The Garlic—A necklet of the cloves or young bulbs is worn by children as a charm against whooping-cough <li data-bbox="253 1305 989 1347">8 <i>Aquillaria Agallocha</i>, Eagle-wood—Beads made of this odiferous wood are occasionally seen <li data-bbox="253 1347 989 1389">9 <i>Areca Catechu</i> Betel nut palm—Polished beads are made from the betel nut they are rarely worn entire but are turned into fancy shapes <li data-bbox="253 1389 989 1431">10 <i>Bamboo</i>—A ring of specially prepared bamboo is placed in the ear-perforation by the Tankul Nagas of Manipur <li data-bbox="253 1431 989 1495">11 <i>Borassus flabelliformis</i>.—The leaves are cut up into neat bracelets and worn by Santal girls |

Personal Ornaments.

BEADS.

Vegetable-beads.

12 *Bauhinia Vahlia*—The dried tendrils are worn as finger-rings by the Santals as a charm in drowsy

13. *Butea frondosa*, The *Palas*—The beautiful bright orange flowers of this tree are sometimes and were formerly extensively worn in the ears by the Hindu women

14 *Cajanus indicus*, The *Urhar*—The wood is made into small beads (see *Adhatoda Vasica*)

15 *Cesalpinia Bonducella*.—Necklaces of the seeds strung upon red silk are worn by pregnant women as a charm to prevent abortion (*Dymock*)

16 *Calotropis gigantea*, The *Akanda* or *Madar*—The purple-coloured corona of the flowers of this plant are in Bengal separated from the rest of the flower and strung into garlands A garland of the flowers is also used in the worship of *Máruti* the monkey god

17 *Canna indica*, The Indian Shot or *Kiwara* or *Lál sarbo-jayá*—The black seeds of this plant are sometimes strung as beads along with the red crab s-eye seeds

18 *Carissa diffusa*.—Flowers strung into garlands and worn in the hair by women on the western coast

19 *Caryota urens*—The dark-coloured oval seeds of this palm are used as buttons and by the Mohammedans are sometimes strung as beads

20 *Coix lachryma*, Job s-tears—There are two principal forms of this grain one almost round and either white or black This form is sometimes though less frequently used for ornamental purposes than the next but it constitutes an important article of food amongst the hill tribes on the eastern frontier of India The second form is tubular, about $\frac{1}{2}$ an inch long This is extensively used for decorative purposes the dresses worn by the Karen women being often completely covered by pretty designs of this grain It is also used by the Nagá and other Assam tribes in the construction of earrings and other simple and elegant articles of personal adornment

21 *Corypha umbraculifera* The *Basarbatu* nuts imported into Bombay also exported from N Kanara by Arabs from the Persian Gulf who trade along the western coast Price R20 to R25 a candy of 616 lbs These are worn as beads by the Hindu devotees

22 Cotton wool in large bundles often 2 3 inches in diameter—Cotton wool is worn in ear perforations by the northern Manipur Nagás and also certain classes of the Nagás proper Similar tufts are also used in decorating the hair As a modern degeneration it is by no means an unusual thing to find two or three empty cartridge cases placed in the ear instead of the cotton decorations—the bra s ends being turned forward

23 *Dalbergia Sissoo*—The green seeds are worn by Santal girls as pendants from the ear

24 *Daphne papyracea*—Garlands of the flowers are used in religious ceremonies in the Panjáb Himálaya at Chumba &c

25 *Diospyros sp.*—Gamble says that the Burmese use the wood for earrings

26 *Elmoearpus Ganitrus* or *Rudraksha*—The five-grooved and elegantly tubercled nuts are worn as a necklace by the followers of *Siva* in order to obtain *Sivalocke* (the heaven wherein the god *Siva* resides) and in order to gain his graces They are also supposed to preserve the health. Considerable importance is attached to the number of facets on the nuts (*Pb Notes and Queries March 1885 p 63*) Imitations of these nuts are made in Eagle-wood

27 *Elmoearpus lanceolatus*, The *Utrasum* Beads.—These are said to be imported from Java.

BEADS

Natural Objects used as Personal Ornaments

Vegetable
beads.

- 28 *Elmocarpus tuberculatus* —As with the two preceding, the nuts of this tree are used as beads
- 29 *Entada scandens* —The large seeds of this climber are worn as charms and made into small ornaments snuff boxes &c They are also largely used by Indian washermen to crimp linen, hence are often called the *Dhobis* nut
- 30 *Euonymus grandiflorus*, The *Sik* Nut —These are strung as necklaces
- 31 *Euonymus fimbriatus* —The red seeds are strung into ornaments for the head
- 32 *Flacourtia Ramontchi* The *Bunj* or *boinch* (see *Adhatoda Vasica*)
- 33 *Ficus glomerata*.—The fruits are strung and put round a pregnant woman's neck on a particular day in the eighth month (*Lisboa Usful Plants Bombay*)
- 34 *Gyrocarpus Jacquini*, *Zaitun* —The seeds are made into rosaries and necklaces
- 35 *Hibiscus rosa sinensis*, The Shoe flower —The flowers are strung into garlands and, combined with the yellow Indian Margold (*genda*) are used in Bengal being specially in demand as an offering to the goddess *Kālī*
- 36 *Ipomoea bilobata* The *Dopati latā* —In Bombay it is said garlands of this creeper are hung around the huts occupied by women on the sixth day after confinement to protect the new born babe (*Lisboa, Useful Plants Bombay*)
- 37 *Jasminum grandiflorum*, The *Jatī* or Spanish Jasmine —The flowers are generally used to make durbar and wedding garlands (*Voigt*)
- 38 *Jasminum Sambac*, *chamba* —The fragrant flowers much used as a hair ornament by women in the Bombay Presidency
- 39 *Linum usitatissimum*, The common *Flax* —\$ Some necklaces said to be composed of sections of the stems of this plant were sent to me from Calcutta (Bazar) along with others which I sent to Kew (*Mr J F Duthie*)
- 40 *Mangifera indica* The mango tree —The leaves are strung into garlands which hang about Hindu temple No marriage or burial ceremony of the Hindus in Western India is complete without these garlands
- 41 *Melia Azedarach*, The *Nim* or Bead Tree —The stone from this succulent fruit is used all over India as a bead These beads are perforated and strung into necklaces and rosaries During the prevalence of epidemics of small pox &c they are suspended as a charm over doors and verandahs to keep off infection
- 42 *Mimosa Elengi*, The *Bakul* —The flowers are strung into garlands The tree is sacred to *Siva*
- 43 *Nerium odorum*, The Sweet scented Oleander (*kanér karabís &c*) —There are two varieties of this plant one red and the other white flowered The flowers are used in garlands
- 44 *Nelumbium speciosum*, The Sacred Lotus or *Padma* —Designs of this flower are frequent in Hindú and Buddhistic sculptures an inverted lotus forming the dome of all Buddhist and Jain temples It is sacred to *Lakshmi* The dry nuts are strung as beads and the flowers in garlands
- 45 *Nyctanthes Arbor-tristis*, The *Singhar* or *harsinghar*.—The natives collect the flowers and string them as necklaces or wear them in the hair (*Drury*)
- 46 *Ocimum sanctum*, The *Tulsi* or Sacred Basil —The ~~spot~~ or woody stem is cut and made into beads worn by the Vaishna ~~vas~~, the rosary consisting of 108 beads The plant is sacred to *Vishná*

The Beaumontia.

BEAUMONTIA
grandifloraVegetable-
beads

47 *Ocimum Basilicum*, The Sweet scented Basil —The wood is used like the preceding

48 *Oroxylum indicum* (*Calosanthes indica*) The *Sona* or *ullu* —The large flat winged seeds of this plant are strung as ornaments to temples

49 *Pandanus odoratissimus* —The sweet smelling spathes which enclose the male flowers and also the male flowers of this tree are perhaps the commonest hair ornament of the western coast Hindu women

50 *Putranjiva Roxburghii*, The *Joti* —The black nuts of this plant are made into necklaces and rosaries and are worn by Brahmins and put round the necks of children to ward off disease caused by evil spirits hence the name *putra jiv*=life of a child

51 *Reeds* —Pieces of reeds are worn in the ears by some of the Assam tribes They are also used to enlarge the ear perforations being by bent like the letter N or W

52 *Samadera indica*. —The seeds are strung together and tied round children's necks as a preventive to asthma and affections of the chest (*Drury*)

53 *Symplocos spicata*, The *Burfi* of Sylhet —*Roxburgh* says the seeds of this plant are very hard about the size of a pea and resemble a minute pitcher when perforated they are strung like beads and by the natives are put round the necks of their children to prevent evil

54 *Tabernaemontana coronaria*, The *Lagar* of Bengal or *Chandni* of Upper India —The flowers are strung as garlands and they are also presented as offerings to the gods

55 *Tamarix articulata* The *Karas* —The wood is made into small ornaments

56 *Tagetes erecta* The Indian Yellow Marigold or *Genda* —Garlands of this flower are largely given by the presiding Brahmans to worshippers It is also extensively used in the decoration of houses along with the red leaf like bracts of *Euphorbia pulcherrima* this constitutes the Christmas decorations of Calcutta The evergreens used on such occasions consist of *Polyalthia longifolia*, the *debdaru* also mango leaves plantain stems and bamboo twigs

57 *Vanda Roxburghii* —The leaves are split and worn by Santal girls as anklets hence the Santal name *darb banki* (*Rev A Campbell*)

58 *Vateria indica* The Indian Copal Tree The resin is made into beads which very much resemble the true amber (*Roxb*)

Bear's Grease. Used medicinally as an emollient in rheumatism

388

BEAUMONTIA, Wall Gen Pl I, 721

389

A genus of evergreen climbing trees or shrubs belonging to the Natural Order APOCYNACEÆ, and containing only 4 species inhabitants of India and the Malaya

Leaves opposite nerves distant arched *Flowers* very large white in terminal cymes bracts leafy *Calyx* 5 partite glandular or not within *Corolla* tube very short throat large bell or funnel-shaped naked lobes broad, overlapping to right *Stamens* at the top of the tube included in the throat filaments thickened at the top anthers horny sagittate conniving over and adhering to the stigma cells spurred at the base *Disc* deeply 5 lobed *Ovary* 2-celled cells many-ovuled style filiform top clavate stigma fusiform *Fruit* long, thick woody at length dividing into 2 horizontally spreading follicles *Seeds* compressed ovoid or oblong top contracted crowned with a pencil of hairs cotyledon thick or thin radicle short superior

Beaumontia grandiflora, Wall Fl Br Ind III 660 APOCYNACEÆ

390

Syn —ECHITES GRANDIFLORA Roxb Fl Ind Ed C B C 246

Vern —Barbari NEPAL

BEES

Indian Bees

FIBRE
391

Habitat—An extensive climber of East and North Bengal with large showy lemon white flowers. It is found from Nepal eastward to Sikkim Sylhet and Chittagong ascending to 4 000 feet.

Fibre—A fibre is prepared from the young twigs

392

BEES

Bees of India— Bees of the genus *Apis* (the hive or honey bee) abound all over India Burma and Ceylon and they are found on the higher regions along the northern boundary of Bhutan and the frontier of Thibet. They are but imperfectly known to European entomologists. A few important varieties have been discovered by the writer while of others only the worker is known. The habits of the known kinds have not been systematically studied under cultivation. There is also much confusion in the nomenclature but the enquiries of **Dr A Gerstaecker** have done much to clear this up. **Gerstaecker** considers the thirteen species described by **Fabricius Latreille Klug Guérin** and **Smith** mostly mere colour varieties comprising only three species which form two distinct groups—the type of one group being *A dorsata* and of the other *A mellifica*. The larger Indian varieties of the second group which the writer is presently examining were unknown to **Gerstaecker**.

Group I
Forms of
393
A dorsata.
394
A zonata.
395
A bicolor
396

Group 1 Apis dorsata—The insects of this group are *A dorsata* **Fab** (*A nigripennis* **Lat**) *A zonata* **Guér** (*A zonata*, **Smith**) and *A bicolor* **Klug**.

Description—The bees of this group differ from *A mellifica* in being larger in building $4\frac{1}{2}$ cells to the inch in the shape of the abdomen in having 13 rows of bristles forming the pollen basket in the relative positions of the eyes and ocelli and in a very slightly different arrangement of nervures of the anterior wings. It would seem that this bee does not build larger cells for drones than for workers and that the drone is similar in shape and size to the worker differing principally in the head which resembles the head of the drone of *A mellifica*. It builds one large comb 3 to 5 feet long 2 feet or more deep the brood comb is $1\frac{1}{2}$ inch thick and the store comb much thicker. Although both *A dorsata* and *A florea* are normally single-comb bees under exceptionally favourable circumstances they build a second comb and their single combs are built much larger than otherwise usual—e.g. *A dorsata*, building in rock cavities and a comb of *A florea* built in a dwelling house was found to be about 5 feet in area in addition to being in some places double the comb of this bee being usually single and perhaps less than one foot in area. Probably in all these very large nests there are several queens and they are not comparable to single stocks of *A mellifica*. The arrangement of the stores and brood is the same as in other species. *A dorsata* as found in India is exceedingly constant in size and colour it is found in forests but frequently builds in towns. It is reputed to be very vicious but unless disturbed it does not attack and could be handled by some of the measures usually employed by bee keepers.

Habitat—*A dorsata* is found all over India but not at great heights above sea level it is said to be found at 2 000 feet or more in Bhutan but may justly be termed a tropical insect indigenous to the plains.

Economic information.—The large size of the comb and bee has excited hopes of this insect proving under cultivation of great economic value and European bee keepers have endeavoured to obtain stocks of it. **Mr Benton** a dealer in foreign bees went to Ceylon for the purpose but he was unfortunate in his efforts for the queens died. He states he

Combs.
397

Wax
398

B 398

Indian Bees.

BEES

does not consider them so vicious as reputed when once hived but he gave up the attempt to cultivate the species. Several years previous the writer undertook to obtain stocks if likely to prove useful in Europe but did not hive any as it was considered better to first investigate the economic value of other Indian species. The reasons against any attempt to cultivate *A. dorsata* in a hive are—(1) The bee builds naturally in the open. (2) It builds normally only one comb so that the honey cannot be removed without removing the brood also. (3) Although it builds a very large comb this comb is not so great in cubic capacity normally as the combs built by a stock of *A. mellifica*, which is readily cultivated and well understood already. (4) It is only found in a tropical climate and in this respect differs from *A. mellifica* and *A. indica*, the most productive varieties of which are apparently indigenous to localities having more or less severe winters. *A. dorsata* probably might be cultivated in a semi wild state in the forests and the produce largely increased by this means. The present practice of indiscriminately robbing every stock found of all its comb stores and brood might be replaced by a more rational mode of procedure for although not hived many of the processes applied in the economic management of *A. mellifica* might be applied to the semi wild *A. dorsata*. The bees might be fed to stimulate breeding or prevent starvation. Excessive swarming might be interfered with. Certain stocks might be selected to breed from as in the old system of bee keeping. It might be found practicable to remove only portions of the comb and the bees might be induced to build on or in artificial structures more accessible than the branches of trees.

Large quantities of both wax and honey are taken in the forests from *A. dorsata* this wax appears to be bought up by dealers and some is exported. The honey is sold and mostly consumed locally but is commonly of very inferior quality being contaminated by pollen the juices of larvae &c. It is also commonly thin and liable to fermentation. The use of a simple extractor care being taken to ripen when necessary and to grade it instead of mixing good and bad together—these and other simple improvements would greatly increase the value of the honey. It appears highly probable that most of the honey produced by bees building in the open air is thin and requires ripening by evaporation to remove its liability to fermentation. Of 60 to 70 specimens sent to the Calcutta Exhibition very few were free from fermentation.

Group 2 *Apis indica*, *Apis florea*—The bees of this group agree with *A. mellifica* in having nine rows of bristles to the pollen baskets and in the division of the anterior wings relative position of eyes in building drone comb in the drones being widely different from the workers in shape &c. In fact as described by entomologists they differ from *A. mellifica* mainly in size and colour. This group includes *A. indica*, *Fab* (*A. socialis*, Lat.) *A. socialis* and *dorsata*, *Lepelletier* (*A. delesserti*, *Guerin*) *A. peronii* Lat. *A. perrotteti*, *Quér* *A. nigrocincta*, *Smith* and *A. florea*, *Fab* (*A. indica*, Lat. *A. lobata*, *Smith*) Dr Gerstaecker regards the last as a distinct species and the others as being colour varieties of another species the *A. indica* of Fabricius.

Description.—*A. florea* is very constant in colour size and shape all over India.

“It is the smallest known specimen of the genus *Apis*. Its worker cells are 9 to the inch and its drone cells about 6 the drone is relatively to the worker much larger than in *A. mellifica*, and has a thumb-like projection on the metatarsi of the posterior legs. This drone also differs in some other structural respects from that of *A. mellifica*.

Like *A. dorsata*, this species builds in the open, a single comb, and is only found in the plains.

Honey
399

Group II
Forms of
400

401

402

403

A. FLOREA
404

| BEES | Indian Bees |
|-----------------|--|
| Comb 405 | Habitat —Its comb is usually built attached to a branch and commonly in bushes but sometimes under the cornices of houses and inside buildings Its comb is often only as large as a man's hand at other times it may as already stated above under <i>A. dorsata</i> , be greatly extended and in part duplicated |
| Wax 406 | Economic information. —The honey is small in quantity and that of the small combs built in the open air is commonly very thin but that found in large sheltered combs is similar to the honey produced by <i>A. mellifica</i> . The honey and wax of this species is not of commercial import since they are often collected but seldom offered for sale |
| Honey 407 | Description — <i>A. indica</i> is described as much smaller than <i>A. mellifica</i> but it is very imperfectly known the writer has found that some varieties are larger than many of the European forms and that <i>A. indica</i> hitherto known to entomologists includes only some varieties and these the smallest and least valuable <i>A. indica</i> differs very widely in size and colour with locality those from the most elevated northern regions being much darker and larger than from the plains |
| A INDICA 408 | The smaller forms of <i>A. indica</i> build 6 cells to an inch producing but little surplus honey and swarming early and frequently so that in the plain stocks are light and of little economic value The Bhutan variety is much larger building 5½ cells to the inch and forming heavier stocks The varieties found in the Hazára District Panjáb and north of Simla on the Thibet frontier are as large or even larger than <i>A. ligustica</i> and appear from the reports received to be at least as productive as <i>A. mellifica</i> . The varieties of <i>A. indica</i> found in the plains generally and at Landour Chumba Mussoorie in Burma Ceylon Assam the Khasia Hills Bengal proper Orissa Kurnool and other parts of the Madras Presidency Central India, the Murree Hills &c are small The varieties met with in the plains are lighter coloured than those of the higher regions the latter have darker bodies than the former and also dark wings All build worker cells 6 to the inch This species is cultivated or rather encouraged in most parts of India for the sake of its honey It is the variety of the small bee which is cultivated at the hill stations several Europeans having been very successful The varieties found in the plains are in some cases more prone to sting than those of the higher regions The Bhutan variety builds more comb than the smaller varieties it is exceedingly easy to handle but is not so courageous as <i>A. mellifica</i> and <i>A. indica</i> of the plains the sentinels at the hive door run in as soon as alarmed instead of coming out and defending the hive All the above varieties so far as known are inferior to <i>A. ligustica</i> under cultivation as they permit the presence of insect vermin in their hives and are therefore very liable to the ravages of moth They appear much more prone to swarm than <i>A. mellifica</i> . The large variety of the Hazára District Panjáb and the cultivated variety of Bashahr are probably as productive as <i>A. mellifica</i> . An attempt is being made to obtain stocks for observation as to productiveness temper and resistance to moth and other vermin so as to bring this economically valuable variety under cultivation The productiveness of <i>A. indica</i> appears least in the plains being there very little and greatest in the higher regions the greatest yield reported from a cultivated stock is 30 lbs of honey |
| Combs 409 | Economic information —Large quantities of honey are obtained from <i>A. indica</i> in the higher regions the honey differs in appearance with the seasons pasturage that obtained in the autumn being usually light coloured Much of the honey is inferior in quality from its liability to fermentation the mode of extracting it and the fact that it is not graded. It varies in price from 2 annas a seer at some hill stations where it is plentiful to 8 annas a lb In the bazars of the towns comb honey of the |
| Wax 410 | |
| Honey 411 | |
| 412 | |
| 413 | |
| 414 | |

Characters of the Begoniaceæ

BEGONIACEÆ

best kind produced in very small quantities by the European methods of cultivation fetches Rs 1 a lb. No doubt wax from *A. indica* is sold but probably the greater portion of the wax taken in the forests and that exported is from *A. dorsata*. The production of wax and honey in India although it attains considerable value in the aggregate admits of enormous expansion by the introduction of improved modes of cultivation and as there is great demand for good honey bee culture would be exceedingly profitable.

“Successful Rearing of *A. mellifica*.”—The culture of the small varieties of *A. indica* will no doubt be replaced by that of the best varieties of *A. mellifica* or the large varieties of *A. indica*. The prevalence of moth during the rainy season and the absence of the long winter rest of Europe will render it preferable to cultivate a species which like *A. ligustica* is specially able to protect itself against moth. The introduction of European species although previous attempts have failed has at last been accomplished and the production of honey and wax will be developed by cultivation of European or sufficiently productive Indian species—the principal points requiring special attention being more frequent superseding of queens where there is little or no winter rest and care to stimulate breeding at such times so as to profit by the early pasturage. *A. ligustica* has been successfully introduced into India, a queen imported into Calcutta in November 1882 died at the end of March 1885 and she was laying abundantly almost the whole of this time. (J. G. Douglas Esq. Telegraph Department Calcutta.)

415

BEESEA, Kunth Gen Pl III 1215

416

A genus of Bamboos reduced by the *Genera Plantarum* to *OCHLANDRA*. The following are the species formerly referred to this genus.

Beesha Rheedu, Kunth Munro 144 Beddome cccxxiv GRAMINEÆ

417

Vern.—*Bish bans* BENG. *Pagu tulla vay vaysha* CHITTAGONG. *Bisha MAL*.

Habitat—A bamboo met with in Malabar and Cochin. stems 16 feet high.

B. stridula, Munro

418

Vern.—*Batta* SINGH.

Habitat—Met with in Bombay and Ceylon. stems 6 to 18 feet high.

B. travancorica, Beddome

419

Vern.—*Iru* TRAVANCORE.

Habitat—Met with in the Hills of Tinnevely and Travancore 3000 to 5500 feet. stems 6 to 8 feet high. A densely gregarious species.

Beet and Beet root, see *Beta vulgaris* Moq. CHENOPODIACEÆ

BEGONIACEÆ

420

A natural order of herbaceous plants referred to two genera,—*Begonia* having 398 species and *HILLEBRANDIA* 1 species.

In India there are over 64 species of the former genus. They inhabit all moist tropical countries except Australia. The affinities of the Natural Order are very obscure; they are most nearly related to Cucurbitaceæ and Datisceæ. The discovery of the genus *Hillebrandia* (in the Sandwich Islands) has suggested a close affinity to Saxifrageæ. They are

B 420

**BEILSCHMIEDIA
Roxburghiana****The Beilschmiedia.**

highly ornamental plants and great favourites of the modern foliage cultivator but they are of no economic value. The following extract from the *Flora of British India* gives the diagnostic characters of the order —

Succulent herbs or undershrubs stem often reduced to a rhizome or tuber. *Leaves* alternate (sometimes falsely whorled in *B. verticillata*) more or less unequal sided entire toothed or lobed stipules 2 free frequently deciduous. *Peduncles* axillary divided into dichotomous cymes the branches and bracts at their divisions generally opposite. *Flowers* white rose or yellow showy sometimes small monocious. *Male perianth* (of the only Indian genus) of 2 outer valvate opposite sepaloïd segments and 2-3 inner smaller segments stamens indefinite often very many free or monadelphous anthers narrowly obovoid. *Female perianth* (of the only Indian genus) of 5 2 segments. *Ovary* inferior (in *Hillebrandia* half superior 2 3 4 celled placenta 5 vertical axile (at the time of aestivation) divided or simple styles 2 4 combined at the base of the stigmas branched or tortuous ovules very many. *Fruit* capsular more rarely succulent often winged variously dehiscing or irregularly breaking up. *Seeds* very many minute globose or narrow cylindric testa reticulated albumen very scanty or 0 (*Flora of British India* Vol II 635)

421

BEGONIA, Linn Gen Pl I 841

Begonia Rex, Pulneys, and other species, Fl Br Ind II 635,
BEGONIACEÆ

FOOD
422

Food—Many species of this herbaceous genus having succulent stems are used as pot herbs and when fresh have a pleasant acid taste.

Speaking of his companion while ascending the Kaklang Pass Sik kim Sir J. D. Hooker says The great yellow flowered *Begonia* was abundant and he cut its juicy stalks to make sauce (as we do apple sauce) for some pork which he expected to get at Bhomsong the taste is acid and very pleasant (*Hooker's Himalayan Journal* Vol I pp 292 93) The natives of Chittagong where the plant is plentiful use the leaves as a pot herb (*Roxb Fl Ind Ed C B C p 676*) It is used by some of the tea planters of Assam as a substitute for Rhubarb.

MEDICINE
Juice
423

Medicine—Several species such as *B. silhetensis*, *C. B. Clarke B. picta Sm B. rubro venia, Hook B. laciniata, Roxb B. Rex Pulneys* The juice is poisonous to leeches and may therefore be used to kill them when found in the nostrils of animals. See *Anagallis arvensis, Linn*, and **Leeches**.

Hair wash
424

§ When clarified with soda bicarb. the juice makes an excellent application for the hair (*Mr G. F. Poynde Roorkee*)

425

BEILSCHMIEDIA, Nees Gen Pl III, 152

A genus of trees belonging to the LAURINEÆ comprising some 20 species, inhabitants of tropical Africa, Asia Australia New Zealand and America.

Leaves sub-opposite or alternate. *Flowers* bisexual in short axillary racemes. *Perianth* deeply 6-cleft deciduous. Outer circle of 6 perfect stamens opposite to the perianth segments and generally alternating with small glands. anthers introrse the inner circle of 3 perfect stamens with lateral semi extrorse anthers alternating with 3 short staminodia. anthers 2-celled valves opening upwards. *Ovary* incompletely 2-celled with 3 ovules style filiform stigma discoid. *Fruit* a dry oblong seeded berry base incompletely 2-celled (*Brandis 378*)

426

Beilschmiedia Roxburghiana, Nees; LAURACEÆ

Syn.—LAURUS BILOCULARIS *Roxb Fl Ind Ed C B C 341*

Vern.—Konkúah OUDH Tarsing NEPAL Kanyu LEPCHA Topchí
GARO Serai guti ASS Shatoo Beng BURM

TIMBER
427

Habitat—An evergreen tree found in Eastern Himálaya up to 8000 feet in Eastern Bengal Burma and the Andaman Islands

B 427

The White Gourd Melon

BENINCASA
cerifera

Structure of the Wood—White moderately hard even grained heartwood with red and green streaks Annual rings marked by sharp lines Weight about 37 lbs per cubic foot

It is used in Assam for boats in Darjeeling for building tea boxes and other purposes

Beleric myrobalan, see *Terminalia belerica* Roxb COMBRETACEÆ

Belladonna, see *Atropa Belladonna*, Linn SOLANACEÆ

BENINCASA, Savt Gen Pl, I 824

429

A genus containing only one species—an extensive climber belonging to the CUCURBITACEÆ most probably a native of tropical Asia Africa and America but cultivated in all tropical countries

Softly hairy tendrils fid Leaves cordate reniform-orbicular more or less 5 lobed petiole without glands Flowers large yellow monœcious all solitary without bracts Male calyx tube campanulate lobes 5 leaf like serrate petals 5 nearly separate obovate stamens 3 inserted near the mouth of the tube anthers exserted free one 1 celled two 2 celled cells sigmoid Female calyx and corolla as in the male ovary oblong densely hairy style thick, with 3 fleshy stigmas ovules numerous horizontal placentas 3 fruit large fleshy oblong pubescent indurulent seeds many oblong compressed margined.

The genus is named after an Italian nobleman Count Benincasa

Benincasa cerifera, Savt Fl Br Ind, II 616

430

THE WHITE GOURD MELON

Syn—CUCURBITA PEPO Roxb includes this plant as well as C PEPO DC

Vern—Petha chal kumra gol kaddu PB Kumri chal kumra BENC Gol kaddu kudmah kondha kumra kumr peth phuthia HIND Kumhra bhunja KUMAON Kohala MAR Ku hmand kohula CUTCH Bhuru kolu koholu GUJ Kohala k holer g lkadu BOMB Gol kaddu SIND Kalyana-pushnik kay LAM Burda gumudu budide gummadi pendli gummadi kaya TEL Kumpalannu kumpalam MAL Bude kumbala kayi KAN Kushmanda kush-pandaha SANS Maydabh ARAB PERS Kyauk-pa yon BURM

References—Roxb Fl Ind Fd C B C (in part) 700 Voigt Hort Sub Calc 57 Duthie and Fuller's Field and Garden Crops N W P p XLV Dymock's Mat Med W Ind 287 U C Dutt Mat Med Hind 167 Official Correspondence Home Dept 1880, p 313 De Candolle L Origin Cult Pl p 213 Baden Powell's Pb Prod 265 Atkinson's Him Dist Vol X 700 &c

Habitat—Cultivated in India according to DeCandolle it is a native of Japan and Java

Botanic Diagnosis—This plant is so like the Pumpkin that the earlier botanists took it for one To distinguish it however from *Cucurbita Pepo*, DC the following characters may be given Softly hairy Male flowers large, solitary, petals 5 nearly free stamens 3 inserted near the mouth of the tube anthers free exserted Fruit 1 to 1½ feet, cylindric, without ribs hairy when young and bright green ultimately becoming smooth and covered with a bluish white waxy bloom flesh white.

CULTIVATION—Duthie and Fuller say that this plant is restricted as a rule to little highly manured patches in the vicinity of village sites In Bengal it is frequently seen creeping over huts,—in fact the oval fruits with the white meanness constitute a striking feature of the Bengal village.

Properties and Uses—

Oil—The fruit of this plant excretes upon its surface a waxy substance which resembles the bloom found on plums and cucumbers This is said to be produced in sufficient quantity to be collected and made into candles

TIMBER.
428

OIL
Waxy
substance
432

**BENINCASA
cerifera****The White Gourd Melon****Oil from seed
433**

The seeds also yield a mild bland pale coloured oil. As this plant has been very much confused by botanists with *Cucurbita Pepo* DC it is probable that some of the native names given above are incorrectly applied to this species. It would be very important to have specimens of the plants from which oils have been prepared supplied along with these oils so as to admit of final determination. The greatest possible ambiguity exists in the literature of this subject.

**MEDICINE
Fruit Juice
434**

Medicine—The fruit possesses alterative and styptic properties and is popularly known as a valuable anti mercurial. It is also said to be cooling. It is considered tonic nutritive and diuretic and a specific for hæmoptysis and other hæmorrhages from internal organs. For this purpose the **FRESH JUICE** from the fruit is administered while a slice of the fruit is at the same time applied to the temples. According to the Sanskrit authors it is useful in insanity epilepsy and other nervous diseases the fresh juice is given either with sugar or as an adjunct to other medicines for these diseases.

It would appear that the older Sanskrit writers were not acquainted with its peculiar action on the circulatory system by which it rapidly puts a check to hæmorrhage from the lungs. The Rāja Nirghantu the oldest work on therapeutics gives a long account of its virtues but does not allude to its uses in phthisis or hæmoptysis. Neither does Susruta mention it in his chapters on the treatment of hæmorrhage and phthisis though the plant is alluded to by him elsewhere. The more recent compilations such as Chakradatta Sangraha Sarangadhara &c give numerous preparations of the article and detail its uses. In preparing this medicine in the form of a confection old ripe gourds are selected. Those not at least a year old are not approved. They are longitudinally divided into two halves and the pulp scraped out in thin flakes by an iron comb or scratcher. The watery juice that oozes out abundantly during this process is preserved the seeds being rejected. The pulp is boiled in the above mentioned juice till soft. It is then tied up tightly in a cloth and the fluid portion allowed to strain through it. The softened and drained pulp is dried in the sun and the watery portion preserved for future use. Fifty *tolas* of the prepared pulp are fried in sixteen *tolas* of clarified butter and again boiled in the juice of the fruit till reduced to the consistence of honey. To this are added fifty *tolas* of refined sugar and the whole is heated over a gentle fire till the mass assumes such a consistence as to adhere to the ladle. The pot is then removed from the fire and a number of flavouring demulcents added such as pepper ginger cumin cardamoms cinnamon &c the mixture being stirred until cold. Dose from one to two *tolas* according to the age and strength of patient. (*U C Dutt*) The **SEEDS** possess anthelmintic properties and are useful in cases of tænia. The expressed **OIL** of the seeds in doses of half an ounce repeated once or twice at an interval of two hours and followed by an aperient is said to be equally efficacious. May be used as a substitute for male fern. (*Official Correspondence from Bombay Committee regarding the revision of the Pharmacopœia of India*)

**Seeds
435
OIL
436
437**

Special Opinions—§ The fresh juice is often used as a vehicle to administer pearl shell for the cure of phthisis in the first stage. (*Assistant Surgeon Sakharam Arjun Rāvat Girgaum Bombay*) It is considered a specific in pulmonary consumption. A native preparation made from the ripe fruit called *Kushandakhanda* is considered very efficacious in phthisis pulmonalis and I have seen people benefited by it. (*Surgeon K D Ghose Bankura*) This is so universally believed to be useful in pulmonary consumption that some trials should be made in order to discover whether it has any effect on the bacillus of phthisis discovered by **Dr Koch**. I have seen it produce a decided effect in arresting pulmonary tuberculosis.

The Barberry Family

BERBERIDEÆ.

(*Surgeon K D Ghose M D Khulna*) Preserve is given in piles and in dyspepsia as an antibilious food (*Surgeon Major W Moir Meerut*)

This forms one of the chief ingredients of the vapour bath used in syphilitic eruptions (*Assistant Surgeon Anund Chunder Mukerji No 1 khilly*) "The expressed juice of the mature fruit possesses purgative and alterative properties. It is used in cases where the system has been affected by mercury (*Brigade Surgeon F H Thornton B A M B Monghyr*) The preserve of the white melon is an easily digestible and highly nutritious food in wasting diseases as consumption (*Surgeon Major R L Dutt Pubna*) Much used in diabetes with successful results the juice of the cortical portoin (4 oz) combined with 100 grains of each of powdered saffron and bran of red rice given morning and evening with strict diet (*Surgeon E W Savinge Rijamundry Coda war District*) The most common way in which the juice is used is in the shape of a confection with sugar &c as a cooling and fattening medicine (*Native Surgeon Ruthnim T Moodelliar Chingleput Madras Presidency*) Useful in pills given with *surun* Antidote for mercurial poisoning administered in the form of *pak* (*Surgeon W Burren Bhuj Cutch*)

Food—The white gourd melon is used in the following ways (a) as a vegetable (b) as a curry and (c) as a sweetmeat called *hesim*

This species is used principally in making a sweetmeat which consists of pieces of the gourd coated with sugar it is said to have cooling properties (*Baden Powell s Panjab Products p 265*)

Ben oil, the oil obtained from the seeds of *Moringa aptera*, Gærtn which see

Benzoin or Benjamin, see *Styrax Benzoin*, Dryand STYRACEÆ

BERBERIDEÆ

A natural order of herbs bushes or climbers comprising about 100 species referred to 19 genera—inhabitants of the temperate regions In India there are only 17 species referred to 6 genera The following descriptive account and analysis of the order extracted from the *Flora of British India* may be found useful —

Usually shrubby sometimes climbing glabrous plants *Leaves* simple or compound with articulate segments buds scaly *stipules* very rare (*Berberis*) *Flowers* often globose regular solitary or in simple or compound racemes usually yellow or white *Sepals* and *petals* free hypogynous very caducous 2 many seriate in 3 rarely 4-6-nary whorls imbricate or the sepals rarely valvate *Stamens* 4 6 (rarely 8) opposite the petals free or connate anthers adnate erect dehiscing by lateral or dorsal slits or by 2 revolute or ascending lids or valves *Carpels* 1 3 rarely more oblong style short or o stigma dilated or conic or oblong ovules usually indefinite on the ventral suture or covering the walls of the ovary anatropous rarely orthotropous *Ripe carpels* dry or fleshy dehiscent or not *Seeds* with a crustaceous fleshy or bony testa albumen copious dense embryo minute or long straight or curved radicle next the hilum

Tribe I—Lardizabaleæ. *Stem* usually climbing *Flowers* unisexual or polygamous *Carpels* 3 *Seeds* usually large testa bony

An erect shrub leaves pinnate
Climbing shrubs leaves digitate
Stamens monadelphous
Stamens free

1. *Decaïsnea*.

2. *Parvatis*.

3. *Holboëllia*.

FOOD
Vegetable
438
Sweetmeat.
439

439a

B 439a

BERBERIS
aristata.**The Barberry**

Tribe II—Berberæ Stem O or erect. *Flowers* hermaphrodite
Carol 1 *Seeds* usually small

Ovules erect basal *Shrubs*

Fruit berried

4. **Berberis.**

Ovules superposed along the ventral suture

Leaves decompose Ovules few

5 **Epimedium**

Leaves simple palmate Ovules many

6 **Podophyllum**

440

BERBERIS, Linn Gen Pl, I 43

A genus of shrubs containing some 50 species the characteristic members of BERBERIDÆ

Wood yellow *Leaves* pinnate or simple and then fascicled in the axils of 3 5 partite spines *Flowers* yellow hermaphrodite fascicled racemed or solitary *Sepals* 6 with 2 3 appressed bracts imbricate in 2 series *Petals* 6 imbricate in series usually with two basal glands inside *Stamens* 6 free anther-cells opening by recurved valves *Ovary* simple stigma peltate sessile or on a short style *ovules* few basal erect *Berry* few seeded

441

Berberis angulosa, Wall Fl Br Ind I III

Vern — *Chutra* NEPAL

Habitat.—A large erect shrub of the inner ranges of East Kumaun Nepal and Sikkim above 11 000 feet

TIMBER

Structure of the Wood—Dark grey or yellowish brown hard Weight about 50 lbs per cubic foot

442

443

B aristata, DC Fl Br Ind I 110

THE BARBERRY

Vern — *Chitra chotra d r hald rasvat kashmal* HIND *Sumlu simlu kasmal chitra* PB *Chitra* NEPAL *Tsema* BHUTIA *Chitra sarishk* LEPS

Moodeen Sheriff gives the following vernacular names arranged under three heads —

(a) **Berries** — *Zarishk* HIND *PERS Zarish DUK Anbar-buris ambarbaris* ARAB

(b) **Extract** — *Rasvat* HIND *Fil sahrah pil sahrah* PERS *Husisehindi fil sahraj* ARAB

(c) **Wood or Root** — *Dar hald dar ch b* PERS HIND *Dar hald* ARAB

444

Berberis aristata, B asiatica, B Lycium and B vulgaris are with difficulty distinguished from each other and in consequence they have been mistaken for each other all over India The same vernacular names are probably applied to each of the e plants and the same properties attributed to all Considerable ambiguity therefore exists in the published statements regarding these Barberries

Habitat—**B aristata** is an inhabitant of the temperate Himálaya between 6 000 and 10 000 feet in altitude extending from Bhutan to Kanawar the Nilgiri Hills Ceylon &c

Botanic Diagnosis—An erect much branched bush leaves evergreen or nearly so obovate or oblong entire or with few distant spinous teeth flowers in compound often corymbose, racemes berries tapering into a short style stigma small subglobose

There are two varieties in addition to the type from **B aristata** 1st **floribunda, 2nd micrantha**

Properties and Uses—

DYE & TAN
Root & Stem

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Dye—A yellow dye obtained from the root and stem is used in tanning and colouring leather The wood is generally known as **dara**

B 445

The Barberry

BERBERIS
aristata.

halada the extract as *rasota*, *rusot rasavanti* or *ruswul* (see also under **B Lycium**) the fruit as *ambarabarisa* (see *Dymock's Mat Med Western India*) **Professor Solly** in *Agri Horticultural Society of India, IV* pages 272-279 writes that the colour exists chiefly in the bark and in the young wood immediately below the bark and that in old wood the proportion is small but much superior in quality. In India it appears the root only is used this doubtless contains colouring matter but according to the Professor not of so good a quality. Barberry is perhaps one of the best tanning dyes in India. The supply is quite inexhaustible some five or six species occur everywhere in great abundance along the entire Himálaya they are temperate bushes growing on exposed hill sides between 6000 and 10000 feet in altitude and often constitute thickets of many miles in length. They are equally plentiful on the Nilgiris and in Ceylon.

Oil—The seed yields an oil.

Medicine—The fruit or berry is given as a cooling laxative to children. The stems are said to be diaphoretic and laxative in rheumatism. The **DRIFT EXTRACT** of the root is extensively used as a purgative for children and especially as an application in ophthalmia. It is also an excellent application for sun blindness. The **ROOT BARK** abounds in the characteristic bitter principle it acts as a tonic and antiperiodic. It is a valuable medicine in intermittent and remittent fevers and in general debility consequent on fevers. It is also used internally in native practice as a stomachic and in diarrhoea &c. The berries are useful as an antiscorbutic.

Special Opinions—§ Instead of the root bark of **B aristata** in my practice I have used the root itself and found it to be quite equal if not superior to the former. Its advantages are that it is about fifty times cheaper and more abundant. The root is one of the few really good medicines in India and deserves the special attention of the profession. As an antiperiodic and antipyretic it is at least quite equal to quinine and Warburg's tincture respectively and as a diaphoretic decidedly superior to James's powder. It is of the greatest service in relieving pyrexia and in converting the continued and remittent fevers into the intermittent and also in preventing the return of the paroxysms of the latter. In addition to its cheapness its advantages over Warburg's tincture and quinine are that however repeatedly it may be used it neither produces a great depression of the system nor has any bad effects on the stomach, bowels, brain or the organs of hearing. Unlike the alkaloids of cinchona it can be employed beneficially during an attack of fever. A very good preparation of the root is the decoction twelve ounces of which is equal to one bottle of Warburg's tincture. If administered during a paroxysm in two doses (3 vi each) at the interval of two or three hours it relieves the fever by producing a copious perspiration. Six drachms of the tincture of the root is equal to one bottle of Warburg's tincture. If used in two doses with water during a paroxysm this produces precisely the same effect as the decoction. There is very little difference between the actions of the tincture and decoction of the root but the former is preferable to the latter for two reasons—*viz* the smallness of its dose and the fact that the tincture can be prepared in a large quantity and kept ready for use. To ensure the full antiperiodic effect the drug should not only be employed during the paroxysm but also in the same dose every fourth or fifth hour in the intermission the cure is completed by the continued use of the drug in smaller doses for four or five days more after the fever ceases to return. Used in the manner explained above the tincture and decoction have proved successful in many cases of malarious and jungle fevers, in a few of which quinine and also arsenic had previously failed. The watery extract and simple powder of the root are very inferior preparations, and generally

OIL
446
MEDICINE
Fruit
447
Stems
448
Extract
449

450

B 450

**BERBERIS
coriacea****Rusat Extract.**

very indifferent in their actions The great and continuous heat which is required to prepare the extract seems to a large extent to destroy its efficacy The wood of *B aristata* particularly that of the stem is also possessed of the same medicinal properties as the root but much inferior to the latter The species of *Berberis* owe their actions to an active principle called *Berberine*

Preparations from the root—Decoction tincture and watery extract *Decoction* Take of the root in shavings or coarse powder six ounces water two pints and a half boil on a slow fire till the liquid is reduced to one pint *Tincture* Take of the root in shavings or coarse powder six ounces proof spirit one pint macerate for seven days with occasional agitation strain and add more proof spirit to make one pint *Extract* Take the shavings or coarse powder of the root in any quantity boil with water till the liquor thickens strain and evaporate on a sand bath to the consistence of an extract *Doses* of the decoction from two to six fluid ounces of the tincture from two to six fluid drachms and of the extract from one to two drachms (*Honorary Surgeon Mooden Sheriff Khan Bahadur Madras*)

The extract (*Rosat*) mixed with opium and lime juice is a most useful external application in painful eye affections (*Surgeon F Anderson M B Bijnor*) I invariably use this drug in the treatment of indolent ulcers and have never had occasion to change it for any other local application (*Surgeon Joseph Parker M D Poona*) The tincture of the root bark official in the Indian Pharmacopæia is found useful in enlargement of the liver or of the spleen in 30-drop doses 3 times daily (*Assistant Surgeon Nilruttan Banerji Etawah*) A good febrifuge and anti-periodic not required during intermission (*Surgeon W Forsyth Dinagepore*) It is known here as *Daru Huldar* the extract as *Rasvati* (*Surgeon Major F Robb Ahmedabad*)

Food—The oblong fruits are dried in the sun like raisins are purplish or pinkish and wrinkled they are eaten and are regarded as palatable

Structure of the Wood—Yellow hard Weight 52 lbs per cubic foot Used for fuel

Berberis asiatica, Roxb Fl Br Ind, I 110

Vern—Kulmora KUMAON Mâte kissi chitra NEPAL

Habitat—Dry valleys of the Himalaya altitude 3 000 to 7 500 feet from Bhutan to Garhwāl Behar (on Parasnath hill) altitude 3 500 feet

Botanic Diagnosis—Bark pale spines 5 fid small leaves orbicular or broad obovate sub-entire or coarsely spinous lacunose white beneath racemes short corymbose berries with a distinct style stigma capitate

Properties and Uses—

Medicine—The medicinal properties of this species are similar to those of the preceding

Food—The fruit is used in the same way as that of *B aristata* DC, and *B Lycium*, Royle

B coriacea, Brandis Gamble, Man Timb 14

Vern—Kashmal SIMLA

Habitat—A large erect thorny shrub of the North West Himalaya, above 8 000 feet often forming alone or with other shrubs large extents of scrubby jungle —e g in the valley south of Nagkanda near Simla

Structure of the Wood—Yellow, moderately hard Weight about 54 lbs per cubic foot

B 457

FOOD
451

TIMBER
452
453

MEDICINE.
454
FOOD
455

456

TIMBER
457

Rasout or Lycium.

BERBERIS
Lycium

Berberis Lycium, Royle Fl Br Ind, I, 110

458

Vern.—*Kashmal chitra* HIND *Kushmul* N W P *Kasmal SIMLA* ;
Darhalad (the wood) BOMB *Kasmal rasout* CUTCH; *Zirishk* (the
 fruit) PERS and *ambarbaris* ARAB *Raswanti* or *rasout* (the extract)

The Sanskrit name *Darv* is in South India given to *Coccoloba fenestratum*, *Colebrooke* but in Northern India it is applied to a species of *Berberis*. The name *rasout* is generally given to the extract from the wood or root of this and of *B asiatica* and *B aristata*. Dr Royle in a paper to the Linnæan Society of London proved that this *Rasout* was the *Lycium* of the ancients. *Lycium* (λυκίον) is mentioned by *Dioscorides*, *Pliny*, *Celsus*, *Galen* and *Scribonius Largus* and by many of the later Greek writers as well as by the Arabian physicians. It was held in high esteem as a drug and was used in the treatment of chronic ophthalmia.

Habitat—An inhabitant of the Western Himálaya in dry hot places altitude 3 000 to 9 000 feet from Garhwal to Hazára.

Botanic Diagnosis—Bark white leaves sub-sessile sub-persistent lanceolate or narrow obovate-oblong usually quite entire pale not lacunose glaucous beneath raceme elongate, berries ovoid style conspicuous stigma capitate.

Properties and Uses—

Oil—The seed yields an oil.

Medicine—The medicinal extract from the root known under the name of *Rasout* is highly esteemed as a febrifuge and as a local application in eye diseases. In chronic ophthalmia it has been used with success when combined with opium and alum. Dr O'Shaughnessy expresses his opinion on the medicinal uses of this drug in the following terms.

Rasout is best given as a febrifuge in half drachm doses diffused through water and repeated thrice daily or even more frequently. It occasions a feeling of agreeable warmth at the epigastrium increases appetite promotes digestion and acts as a very gentle but certain aperient. The skin is invariably moist during its operation.

Some difference of opinion prevails as to whether *rasout* should be regarded as a special preparation from the root of this species only or from *B asiatica*, *B aristata*, as well as *B Lycium*. The extract has been used by a few European practitioners and found useful in the treatment of chronic ophthalmia. It was employed for this purpose by Mr Walker of Edinburgh who found it very efficient. The preparation used by him consisted of equal quantities of *Lycium* and burnt alum with half the quantity of opium. It was applied mixed with lemon juice to the consistence of cream over the eyelids and eyebrows. (*U S Dispens 15th Ed*) It has also been frequently used and favourably reported on by European doctors in India. A tincture of the root bark is often recommended in the treatment of fevers.

Special Opinions—§ In hæmorrhoids *Rasout* is a very popular remedy in doses of from 10 to 30 grains. (*Assistant Surgeon Mokund Lall Agra*)

The watery extract is a bitter tonic and febrifuge in doses of half a drachm. In combination with equal parts of alum and opium it is used as a *lep* to the eyelids in ophthalmia often acting like a charm subduing swelling and allaying irritability. Previously to its application the eyelids should be fomented with *tukmí páni* or *ním páni*. (*Surgeon C M Russell Sarun Bengal*) Similar in action to the sulphate of *Berberis* useful in eye diseases. (*Surgeon W Barren Bhuj Cutch Bombay*)

Is taken internally in 5 to 15 grain doses with butter in bleeding piles. Its solution 1 drachm to 4 oz of water is used as a wash for piles. Its ointment, made with camphor and butter, is applied to pimples and

OIL
450
MEDICINE
Extract
460

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**BERBERIS
vulgaris****The Barberry****TIMBER
462****463****DYE
464
TIMBER
465****DYE
466
MEDICINE
467****468**

boils being supposed to suppress them (*Surgeon F C Penny M D Amritsur*) Is an excellent tonic and febrifuge especially in the low fevers of aged people the tincture in $\frac{1}{2}$ drachm doses (*Surgeon D Picachy Purneah*) The Nilgiri barberry has been used in the treatment of ague with good results (*Surgeon General W R Cornish Madras*)

Structure of the Wood—Yellow moderately hard Weight 52 lbs per cubic foot

Berberis nepalensis, Spreng Fl Br Ind, I, 109

Syn.—*B PINNATA Roxb Fl Ind Ed C B C MAHONIA NEPALENSIS DC*

Vern—*Amulanda chror Pb Chatri milkisse jamnemunda NEPAL*

Habitat—A shrub or small tree with large pinnate leaves common on the outer Himálaya from the Ravi eastward to the Khásia and Naga Hills Tenasserim and the Nilgiris at altitudes above 5 000 feet

Botanic Diagnosis—Leaves pinnate leaflets opposite oblong ovate or lanceolate spinous toothed palmately 3 5 nerved racemes dense flowered

Properties and Uses—

Dye—Used to a small extent by the Bhutias and Nagas as a yellow dye

Structure of the Wood—Bright yellow hard Weight 49 lbs per cubic foot

Has a handsome colour and might be useful for inlaying

B vulgaris, Linn Fl Br Ind, I 109

THE TRUE BARBERRY *Eng* EPINE VINETTE VINFTTIER ECORCE DE RACINE DE BERBERIDES *Fr* FAUERACH GEMEINER SAUERDORN BERBERRITZE BERBERITZEN (SAURCH) WURZEL RINDE *Germ* BFRBFRO *It, Sp*

Vern—*Zirishk kashmal chachar or chochar Pb Bedana cutch PERS Ambar baris ARAB*

Habitat—A deciduous thorny shrub on the Himalaya from Nepal westward in shady forests above 8 000 feet Afghánistan and Beluchistan to Europe

Properties and Uses—

Dye—A yellow dye is extracted from the roots along with alkaline ley is used in Poland for colouring leather

Medicine—The Barberry is regarded as officinal in the Panjab being given as diuretic and for the relief of heat thirst and nausea It is astringent refrigerant and antibilious In small doses it is tonic in larger cathartic It was formerly given in jaundice probably on the principle of signature the yellow colour suggesting its supposed efficacy

§ Cooling laxative medicine In the form of decoction it is useful in scarlet fever and brain affections (*Surgeon W Barren Bhuj Cutch*)

Dried like raisins or currants the berries greatly resemble the latter (*Surgeon Major F E T Aitchison Simla*) Diuretic demulcent in dysentery (*Assistant Surgeon Nehal Sing Saharunpore*)

Chemical Composition—*Dr Græger* found in the ripe fruit 15.58 per cent of integuments and seeds 17.20 of soluble solid constituents and 67.22 of water The constituents of the juice in 100 parts of fresh berries were 5.92 parts of malic acid 4.67 of sugar 6.61 of gum 67.16 of water and 0.06 salts of potassia and lime (*A F P Fan 1 1873 p 14*) The root and inner bark have been used for dyeing yellow The bark of the root is greyish on the outside yellow within, very bitter and stains the

B. 468

The Trincomali Wood

BERRYA
Ammonilla.

saliva when chewed **Brandis** found in 100 parts of the root 6.63 of bitter yellow extractive (impure berberine) 1.55 of brown colouring matter 0.35 of gum 0.20 of starch 0.10 of cerin 0.07 of stearin 0.03 of chlorophyll 0.55 of a sub-resin 55.40 of lignin and 35.00 of water

To a second alkaloid found in barberry bark the names of *vinetine oxyacanthine* and *berbine* have been applied. To procure it the mother liquor of berberine is precipitated by carbonate of sodium the precipitate treated with dilute hydrochloric acid and the liquid filtered and precipitated by ammonia. The impure alkaloid thus obtained may be purified by washing with water drying exhaustng with ether evaporating dissolving the residue in dilute hydrochloric acid and finally precipitating by ammonia. *Vinetine* is a white amorphous powder crystallizable from its alcoholic and ethereal solutions purely bitter fusible unchanged at 139.50° C (283° F) insoluble or but slightly soluble in water sparingly dissolved by cold but freely by hot alcohol and ether and freely soluble in alcohol. It forms soluble salts with the acids and its chloride is white (*U S Dispens 15th Ed 1586*)

Food—The dried fruits under the name of *sirish tursh sarishke trush* (sour currants) are imported from Cabul Herat and Kandahar into the Panjáb. They form a pleasant acid preserve the unripe ones are pickled as a substitute for capers.

Structure of the Wood—Lemon yellow moderately hard and even grained. Weight 55 lbs per cubic foot.

A good firewood.

FOOD
Fruits
469

TIMBER
470

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BERCHEMIA, Neck Gen Pl I 377

Berchemia floribunda, Wall Fl Br Ind I 637 RHAMNÆ

Vern.—*Kala lag* KUMAON *Chiaduk* NEPAL *Rungyeong rik* LEPCHA

Habitat—A large erect or climbing shrub or small tree found in the Himalaya from the Jhelum to Bhutan and on the Khasia Hills.

Structure of the Wood—Yellow turning grey on exposure porous

TIMBER.
472

Bergamot, see Mentha citrata, LABIATÆ

Bergamotte, or Lime, see Citrus Limetta, and

Bergera Koenigii, Linn see Murraya Koenigii, Spreng RUTACEÆ

BERRYA, Roxb Gen Pl I 232

473

A genus of TILIACEÆ containing only one species a large tree. *Leaves* alternate ovate acuminate glabrous base cordate 5-7 nerved *Panicles* large many flowered terminal and axillary *Calyx* campanulate irregularly 3-5 lobed *Petals* 5 spathulate *Stamens* many inserted on a short torus anthers didymous lobes divergent opening lengthwise *Staminodes* 0 *Ovary* 3-4 lobed cells 4-ovuled style consolidated stigma lobed ovules horizontal *Fruit* loculicidally 3-4 valved each valve 2 winged *Seeds* pilose albumen fleshy cotyledons flat leafy radicle superior next the hilum

The generic name is in honour of the late Dr Andrew Berry a Madras botanist.

Berrya Ammonilla, Roxb, Fl Br Ind, I, 383

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THE TRINCOMALI WOOD

Vern.—*Sarala-dévaru* TEL *Hpet-moon, petwun* BURM *Halmil* *ula* or *halmilla* SINGH

Habitat.—A large tree found in South India, Burma and Ceylon

B 474

**BETA
maritima****The Beet-root.***Properties and Uses—*

Fibre—In the *Amsterdam Catalogue* a fibre from this tree is mentioned as having been sent from Burma

Structure of the Wood—Heartwood dark red very hard close grained but apt to split it has even when old, a smooth rather damp feel The wood is very durable **Mr Gamble** reports that a specimen which had been 50 years in Calcutta was found to be perfectly sound and good on being cut into Weight 48 to 65 lbs per cubic foot

It is used for carts agricultural implements and spear handles and in Madras for masula boats and is much esteemed for toughness and flexibility In Ceylon the wood of this fine tree is very valuable for building and other purposes (*Thwaites Enum Ceyl Pl 32*)

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Berrya Ammonilla, Roxb, var mollis

Vern—*Hpekwoon* BURM

Is found on elevated ground the wood which is red is much prized for axes the poles of carts and of ploughs and spear handles it is also sawn up for building purposes (*Br Burm Gas I 127*)

Berthelotia lanceolata, see Pluchea lanceolata, Oliv COMPOSITÆ

479

BETA, Linn Gen Pl III 52

A genus of herbaceous plants belonging to the CHENOPODIACEÆ comprising some 12 or 13 species

Glabrous herbs with fleshy radicle leaves *Flowers* small ternate or glomerulate rarely solitary glomerules axillary or on simple or paniculate terminal spikes *Flowers* hermaphrodite *Perianth* 5 partite persistent and adherent to the base of the ovary *Stamens* 5 perigynous filaments subulate anthers oblong *Ovary* semi inferior and surrounded by the staminal and perianth fleshy ring stigma 2 3 rarely more short subulate connate at the base papillose on the inner surface *Seed* horizontal attached laterally testa membranous

The generic name is the classical Roman name for the cultivated species The ancient Greeks who used the leaves and roots called the plant *Teuthlion* also *Sevkle* or *Sfekelie* a word which very much resembles the Arab *Selg Silq* The latter word has apparently been adopted by the Portuguese who call it *Selga* The Celtic word *Bett* = red may be the source from which the word Beta was derived (*DeCandolle*)

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Beta maritima, L**THE BEET ROOT**

Syn—*B VULGARIS Moq*

Vern—*Palak* HIND *Palak bit palang* or *palang sag* BENG *Palanki SANS* (according to *U C Dutt*)

Habitat—Two or three distinct forms are very extensively cultivated over the greater part of India as a cold season crop The principal are the *Red Beet (B vulgaris)* and *White Beet (B Cicla)* These are chiefly grown by Europeans the root being extensively used as a vegetable The so-called Indian *Beet (B bengalensis, Roxb)* is an erect branched species cultivated by the natives on account of the leaves which are eaten as a vegetable in stews curries &c

Food—The manufacture of sugar from the beet root has within recent years become one of the most important industries of Europe The white root is chiefly used for this purpose In 1830 the extraction of beet sugar commenced in Germany and France but it has now spread all over the Continent and to Canada the United States, and New

**FOOD
Sugar
481**

Beet Sugar

BETA
maritima.

Zealand In fact it is cultivated in most countries where the mean temperature is about 62 to 65 F A moist hot atmosphere is unfavourable hence of course India is precluded from ever becoming a beet sugar producing country The plant grows freely enough in the cold season but as a garden crop only Mr Duthie in his annual report of the Saharanpur botanic gardens for 1884 says By constant selection of the darkest coloured roots for seed stock it has improved so that the roots are now hardly distinguishable from those raised from the best imported seed Few plants are more easily modified than beet by careful cultivation, but while as Mr Duthie says it is possible to produce an acclimatised stock which will yield seed as good as that imported from Europe the plant is not likely however to be cultivated in India as a field crop either to feed cattle or as a source of sugar The interest in beet sugar as far as India is concerned consists entirely in the fact that it affects materially our cane-sugar industry and must necessarily continue to do so France Austria and Germany in order to foster and develop the beet sugar trade instituted a protective system of giving bounties to home refiners and at the same time heavy importation duties were levied upon all foreign sugars This system naturally led to a vast extension of beet cultivation and of refining operations Over production soon caused ruinous reduction in prices of sugar cane sugar falling in the exact ratio with beet This naturally resulted in the bankruptcy of numbers of beet growers and of some of the largest refiners a financial crisis having occurred in Vienna in consequence of these failures The area under beet may now undergo some contraction and probably will do so prices improving in consequence but unless this actually takes place a prolonged low price like what now prevails must prove disastrous to the cane sugar industries of the East and West Indies Already the beet sugar trade has materially affected the cane-sugar of India and the extension of cane sugar cultivation in Fiji Queensland and other places is not calculated to lessen the danger

In Mr Giffens report to the Board of Trade (London 1884) will be found much interesting and valuable information which cannot be too carefully studied by our cane sugar producers The total sugar crop of the world at the present time may be put in round figures at 6 000 000 tons The known increase in 30 years has been very nearly half that amount Mr Giffen further writes As bearing on recent controversies it may also be of interest to point out that since the date of giving my evidence British cane sugar appears to have increased quite as much in proportion as beet root sugar In 1877 79 the production of British cane sugar was 403 000 tons per annum and its proportion to the total 12 per cent in the following three years the production was 419 000 tons per annum and its proportion to the total was still 12 per cent Possibly later figures may show a different result but if there has been any change it must have been quite recent For about 15 years it will be seen the proportion of British cane sugar in the total production has been the same as it is now viz 12 per cent The remarkable growth of beet root sugar in recent years would thus seem to have been mainly in competition with foreign cane sugar Though the production of that sugar in amount has steadily increased its proportion to the whole has fallen from 60 per cent 20 years ago to 40 per cent at the present time British cane sugar on the contrary has not only increased in amount, but has increased so rapidly for 15 years at least as to maintain its former proportion to the total production The production of beet sugar being about 2 000 000 tons the proportion of beet to cane in the sugar production of the world is thus about one third (*Report Board of Trade London 1884*)

In his Review of the Sea Borne Foreign Trade of British India for

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BETULA
alba.**The White Birch**Alcohol
484

1884 Mr J E O'Conor has given an interesting *résumé* of the present position of the Indian sugar trade. In March 1882 the import duty of 5 per cent on sugar was taken off with other import duties, and the remission was vehemently opposed by the representative in the Legislative Council of the mercantile community of Calcutta on the ground that it would assuredly bring about the extinction of the sugar industry in Bengal. The prediction so far has been singularly falsified and if the trade should collapse now, after having had for two full years since the abolition of the duty a far more flourishing existence than it had ever previously known its decay must be attributed to other and wholly different causes than the removal of a protective duty.

In addition to sugar alcohol is also prepared from beet root. This is effected in three different ways (a) by rasping the roots and submitting them to pressure thereafter fermenting the expressed juice (b) by maceration with water and heat (c) by direct distillation of the roots. For full details of the preparation of beet sugar and beet spirit the reader is referred to *Spon's Encyclopædia* p 1831 *Tropical Agriculture by Simmonds* will also be found to contain (p 213) an interesting account of beet sugar. An effort was made to introduce the cultivation of beet for the purpose of sugar manufacture into Kashmir but the scheme came to nothing (*Stewart*).

MEDICINE
485

Medicine—The seeds have cooling and diaphoretic properties. **Bellew** says that the fresh leaves are applied to burns and bruises.

Betel leaf, see *Piper Betle*, *Linn* PIPERACEÆ

Betel nut, see *Areca Catechu*, *Linn* PALMÆ

486

BETULA, *Linn Gen Pl, III 404*

A genus of small trees belonging to tribe BETULÆ of the Natural Order CUPULIFERÆ comprising some 25 species inhabitants of the cold temperate regions of Europe Asia and America.

Deciduous trees with serrate leaves having resinous dots beneath. *Flowers* all in catkins scales of the barren catkins ternate the middle one bearing the stamens. *Persanth* absent scales of the fertile catkin 3 lobed 3 flowered membranous deciduous. *Female flowers* 3 in the axil of each bract bracts deciduous on fruiting and generally membranous. *Ovary* 1-celled each with 1 ovule styles 2 filiform. *Fruit* naked indehiscent 1-celled 1-seeded membranous winged.

The generic name is derived from *Betu* CELTIC or *Beithe* GAEL the *Birch* ENG and *Betula* or *Betulla* LATIN *Bhurja* SANS and *Bhu* and *Burich* hill names in the Panjáb Himálaya.

487

Betula alba, L

THE EUROPEAN OR WHITE BIRCH

Habitat—The white birch is common throughout Europe Siberia, Asia Minor and North America. It approaches nearer to the pole than any other tree and frequents alpine regions where plants are scarce.

Properties and Uses—

This is perhaps one of the most useful trees of Northern Europe. A few of its properties may be here enumerated by way of comparison with our common Indian species. The wood is too soft to be employed as a building material but it is valued by cartwrights upholsterers and turners for its tenacity. It is much used for firewood and its charcoal is in high demand. The bark is impermeable to water and very durable if submerged or kept below the soil hence it is put to a variety of purposes, such as for utensils, shoes cords boxes snuff boxes and for preserving roofs from moisture. A variety (or distinct species) *B papyracea*, is made

Bark
488**B 488**

Hill Tribes eat the Birch Bark.

**BETULA
acuminata.**

into the light and portable birch canoes of Canada these are formed of slabs of birch bark bound together by the root fibres of the white fir

Birch bark contains an astringent principle used in tanning leather a resinous balsamic oil which by distillation becomes empyreumatic and is used in the preparation of russia leather The cellular part of the bark is rich in edible starch and thus forms a valuable source of food to the Samoides and the Kamtschatkans This sap is sugary before the sprouting of the leaves and is considered an excellent antiscorbutic in North America and both vinegar and beer are prepared from it (*La Maout and Decaisne's System of Botany*)

Birch tar is made to a small extent in Russia where it is called Dagget from the wood of *Betula alba*, L It contains an abundance of pyro-catechin and is esteemed on account of its peculiar odour well known in the russia leather A purified oil of birch tar is sold by the Leipzig distillers (*Fluck and Hanb Pharmacog 623*) The extraction of birch bark oil is an industry of some importance in North Europe and Siberia and is conducted in the following manner An iron pot is filled up with bark and covered with a close fitting lid through which is inserted an iron pipe On this is inverted a smaller pot and the rims are carefully fitted together and well luted with clay The two are then turned upside down so that the pot with the bark in it is uppermost The apparatus is half sunken in the ground well banked with a mixture of sand and clay and a wood fire is kindled around it When this distillation has continued long enough the luting is removed and the pots are separated when the lower one is found to contain a thin oil floating on pyroligneous acid or when the bark has been impure on pitch The yield of pure birch bark oil is about one third by weight of the white bark used (*Spons Encyclop*) This property is apparently unknown to the natives of India

Medicine—In Europe and America birch oil has been found useful as a local application in chronic eczema The young roots and leaves secrete a resinous substance having acid properties which combined with soda is said to produce the effects of a tonic laxative The inner bark which is bitterish and astringent has been employed in intermittent fevers

The leaves which have a peculiar aromatic agreeable odour and a bitter taste have been employed in the form of infusion in gout rheumatism, dropsy and cutaneous diseases (*U S Dispens 15th Ed 1587*)

Betula acuminata, Wall *Brandis For Fl, 458 Gamble Man Timb 372*

Vern—Puya udish hambar máya makshéri sheori shag Pn Bhú; pattra haur shaul HIND Haoul KUMAON Shakshin IHHET Saver sauer payang utis NEPAL Hlosungli LEPCHA Dingleen KHASIA

Habitat—A large tree met with in the Himálaya from 6 000 to 8 000 feet in the Khásia Hills the mountains of Mánipur and the Nagá Hills to Martaban

Properties and Uses—

Fibre—The bark when mature peels off in larger slabs than in any of the other species and is therefore not so serviceable for the purposes to which the others are put

Food—On the mountain tracts of North East Mánipur bordering on the Nagá Hills the Lahupas cut off the bark in large slabs just before the leaves appear The inner layer of these slabs is carefully separated from the liber and sun-dried. This is either eaten like biscuits or it is reduced to flour and cooked as an article of food The tree is much prized by these naked savages, and in early spring yields a considerable

Starch
480
Sugar
490

Tar
491

OIL
492
RESIN
493
Bark
494
Leaves.
495

496

FIBRE
497

FOOD
Bark
498

Prepared
Biscuits.
499

**BETULA
Bhojpattra-****The Indian Paper Birch****TIMBER
500**

portion of their diet This remarkable fact does not appear to have been observed by any traveller previous to my exploration in 1880 of the hill tracts of Mánipur and apparently the nutritious properties of the bark have not been discovered by other Indian hill tribes (See remarks under **B alba**)

Structure of the Wood—White moderately hard close grained Weight 41 lbs per cubic foot

It is very little used but Wallich says it is hard and esteemed in Nepal for all purposes where strength and durability are required The wood is close grained and takes a fine satin polish It is particularly good for door panels and the examples in the Government House at Nainí Tál show that it is a valuable acquisition for ornamental work (*Atkinson s Him Dist (X N W P Gaz)* 818)

501

Betula Bhojpattra, Wall Brandis, For Fl, 457 Gamble Man Timb, 372

THE INDIAN BIRCH TREE, INDIAN PAPER BIRCH

Syn—*B JACQUEMONTII Spach*

Vern—*Bhujpattra* or *bhujpatar* HIND *Burj bursal bhuj phurs* PB *Shuk* or *shag pad phatak, takpa* LADAK LAHOUL PITI KANAWAR *Takpa* BHUTIA *Phuspat* NEPAL TUZ, BHOTE *Bhurjapatra bhojpatra* BOMB *Bhuja patra* CUTCH *Bhojapatra* GUJ *Bhurja putra* SANS *Bhujapatra chettu* TEL

Habitat.—A moderate sized deciduous tree found in the higher ranges of the Himálaya forming the upper edge of arborescent vegetation and ascending to 14 000 feet

Properties and Uses—**FIBRE
Paper
substitute
502****Young
twigs
503****Books
504****Pipe-stems
505**

Fibre—The bark is used as a substitute for paper by some of the hill tribes and supposed by them to be more durable than paper It is brought down to the plains and largely used in the manufacture of hookah tubes The young branches are plaited into twig bridges The bark is well known as the material upon which the ancient Sanskrit manuscripts of Northern India are written Dr Buhler in his account of a tour in Kashmír in search of Sanskrit manuscripts says The Bhurja MSS are written on specially prepared thin sheets of the inner bark of the Himálayan birch and invariably in Sárada characters The lines run always parallel to the narrow side of the leaf and the MSS present therefore the appearance of European books not Indian MSS which owe their form to an imitation of the Talapatras The Himálaya seems to contain an inexhaustible supply of birch bark which in Kashmír and other hill countries is used both instead of paper by the shopkeepers in the bazars and for lining the roofs of houses in order to make them water tight It is also exported to India where, in many places it is likewise used for wrapping up parcels and plays an important part in the manufacture of the flexible pipe-stems used by hookah smokers To give an idea of the quantities which are brought into Srinagar I may mention that on one single day I counted fourteen large barges with birch bark on the river and that I have never moved about without seeing some boats laden with it None of the boats carried I should say less than three or four tons weight "

The use of the birch bark for literary purposes is attested by the earliest classical Sanskrit writers Kalidasa mentions it in his dramas and epics *Susruta, Varahamihira* (circa 500-550 A D), know it likewise. Akbar introduced the manufacture of paper and thus created an industry for which Kashmír is now famous in India From that time the use of birch bark for the purpose of writing was discontinued, and

B 505

| The Abor Vitæ. | BIOTA orientalis. |
|--|---|
| <p>the method of preparing it has been lost The preparation of the ink which was used for Bhurja MSS is known It was made by converting almonds into charcoal and boiling the coal thus obtained with <i>gomutra</i> (<i>Urina bovis</i>) this ink is not affected by damp or water (Journal, (Bombay Branch) Royal Asiatic Society Vol XII No XXXIVA) (Dr Dymock <i>Mat Med W Ind</i> 602)</p> | |
| <p>The bark peels off in large sheets and is used for umbrellas for writing upon and for the flexible tubes of hookahs Every consignment of the ornamental papier maché ware of Kashmir reaches the Panjab packed in wrappers of birch bark The houses of Kashmir are often wrapped with it (Baden Powell <i>Panjab Products I</i> p 569) "The bark is used for <i>chatta</i> or rude umbrellas and for covering tubes of <i>hookahs</i> or native smoking pipes and being of a sacred character it is burnt on the funereal pile Hindu pilgrims visiting the shrine of Amrnat in Kashmir divest themselves of their ordinary clothes before entering the shrine covering their bodies with the <i>bhojpattra</i> It is now brought to the plains for lining the tubes of <i>hookahs</i> and the leaves or bark are used to cover the baskets of Ganges water sold by itinerant pilgrims (Balfour's <i>Cyclop</i>)</p> | <p>Umbrellas. 506</p> <p>Clothing 507</p> |
| <p>Medicine—The bark of the black birch is valuable for its aromatic and antiseptic properties (Murray)</p> | <p>MEDICINE Bark 508</p> |
| <p>Special Opinions—§ The decoction of the bark is used as a wash in otorrhœa and poisoned wounds (U C Dutt <i>Civil Medical Officer Serampore</i>) The infusion of the bark is used as a carminative it is prescribed also in hysteria (Surgeon W Birren <i>Bhuj Cutch</i>) Much used to write medicinal charms upon (Surgeon Major W Dymock <i>Bombay</i>)</p> | <p>Charms 509</p> |
| <p>Fodder—The leaves are lopped for cattle fodder</p> | <p>FODDER Leaves 510</p> |
| <p>Structure of the Wood—White with a pinkish tinge tough even grained moderately hard Weight about 44 lbs per cubic foot</p> | <p>TIMBER 511</p> |
| <p>It is extensively used in the inner arid Himalaya for building it is elastic seasons well and does not warp</p> | <p>Cups. 512</p> |
| <p>Wood good used for cups common turnery and for fuel by travelers in the higher ranges (Baden Powell <i>Panjab Products p</i> 969)</p> | <p>Fuel 513</p> |
| <p>Betula cylindrostachys, Wall</p> | <p>514</p> |
| <p>Vern—Shaoul KUMAON Sauer NEPAL Sungli LEPCHA</p> | <p>TIMBER. 515</p> |
| <p>Habitat.—A tall deciduous tree met with in Kumaon Nepal Darjiling Hills from the Terai up to 6000 feet</p> | <p>Railway fuel 516</p> |
| <p>Structure of the Wood—Red hard heavy strong and seasons well Weight 52 lbs per cubic foot</p> | |
| <p>Seldom used except for firewood and charcoal for which purposes it is very good Experiments made by Mr Whitty with several kinds of wood fuel for the Darjiling Himâlayan Railway showed that this was the best for locomotive purposes</p> | |
| <p>Bhang, see Cannabis sativa, Linn URTICACEÆ.</p> | |
| <p>Bile of certain animals, see Fel.</p> | |
| <p>BIOTA, Endl Gen Pl, III 427</p> | <p>517</p> |
| <p>This genus has, by the <i>Genera Plantarum</i> been reduced to THUYA Linn which see</p> | <p>518</p> |
| <p>Biota orientalis, Endl CONIFERÆ</p> | |
| <p>THE ABOR VITÆ</p> | |
| <p>Syn.—THUYA ORIENTALIS Linn</p> | |

**BIXA
Orellana.****The Arnatto Dye.****Birch, Indian, see** *Betula Bhojpattria, Wall***Birch oil, see** *Betula alba L*

519

BISCHOFIA.

A genus of EUPHORBIACEÆ containing only one species a large glabrous tree with trifoliate leaves and caducous stipules. *Flowers* diœcious or monœcious in axillary panicles. *Calyx* of 5 valvate segments those of the male flowers concave enclosing the stamens at first afterwards reflexed those of the female flowers lanceolate. *Petals* none. *Stamens* 5 opposite the segments and inserted round a raised circular central body (the rudimentary ovary) *filaments* very short. *Ovary* 3 celled 2 ovules in each cell. *styles* linear entire. *Fruit* a globose drupe enclosing 3 indehiscent 1 2-seeded cocci (*Brandis For Fl 445*)

The genus is named after **Dr A Bischof**

520

Bischofia javanica, Bl Brandis, For Fl 446**Syn**—ANDRACHNE TRIFOLIATA Roxb *Fl Ind Ed C B C 1703*

Vern—Kein korsa urum HIND Kanyal NEPAL Sinong LEPCHA
Taisoh urum MECHI Uriam ASS Bolsuru GARO Joki CACHAR
Boke BOMB Thondi TAM Goarnellu HASSAN Modagerri vembu
INNEVELLY Yagine (?) BURM

Habitat—A deciduous tree met with in Kumaon Garhwal Oudh Gorakhpur Bengal South India and Burma

Structure of the Wood—Red rough moderately hard with a small darker coloured heartwood. Weight 47½ lbs per cubic foot

In Assam it is esteemed one of the best timbers and used for bridges and other works of construction. **Beddome** says it is used by planters in the Nilgiris for building and is sometimes called *Red Cedar*

TIMBER
521**Bitch or Bish, see** *Aconitum ferox* and **A Napellus, Wall** RANUNCULACEÆ**Bitter-sweet, see** *Solanum ducamara, Linn* SOLANACEÆ

522

BIXA, Linn Gen Pl III, 125

A genus of BIXINEÆ containing one or at most only two species of large spreading bushes

Leaves simple stipules minute. *Flowers* in terminal panicles 2-sexual. *Sepals* 5 imbricate deciduous. *Petals* 5 contorted in bud. *Anthers* opening by 2 terminal pores. *Ovary* 1-celled style slender curved stigma notched. *ovules* many on 2 parietal placentas. *Capsule* loculicidally 2 valved placentas on the valves. *Seeds* many funicle thick testa pulpy albumen fleshy embryo large cotyledons flat

The generic name is supposed to be derived from the vernacular name given to the plant by the Indians of the Isthmus of Darien

523

Bixa Orellana, Linn Fl Br Ind, I, 190

THE ARNATTO OR ARNOTTO DYE, ROCOU (derived from *Urucu*, the Brazilian name), *Fr*

Vern.—Lathan lathkan wathana HIND BENG Koug kuombi SANTAL
Farat jolandhar ASS Gulbas URIYA Powasi CHITTAGONG
Reipom, MANIPUR; Shdi ké-pandu ka jhar DUK Kisri kesari, kesuri
sendri or shendri MAR BOMB Japhara-chettu jafra vittulu chettu
kurungu munji-vittulu chettu TEL Japhra-maram jafra vras mar
am kurungu munji-varai maram TAM Kuppa mankala rangamali
rangamali hannu (the fruit) KAN Thidin thi-deng BURM

Habitat—A graceful shrub with handsome white or pinkish flowers

B 523

The Arnatto Dye.

BIXA
Orellana

and echinate red capsules originally a native of America now largely cultivated in India for the red or orange dye obtained from the pulp which surrounds the seed. Found in Pegu and Tenasserim. Cultivated and escaped. (*Br Burm Gas I, 136*) Extensively cultivated by the better class of ryots in Raipur, Central Provinces.

Botanic Diagnosis—Two forms of this plant are equally plentiful in India the one with white flowers and greenish capsules and the other with pink flowers and red capsules. These cannot be regarded botanically as varieties but they are recognisable and curiously enough the natives of India regard the former as indigenous while they readily admit that the latter is an introduction. **Roxburgh** even seems to have regarded the white flowered form as indigenous but modern botanists do not support this view. **Dr Buchanan Hamilton** a contemporary of **Roxburgh's** published in 1833 the following interesting account from which it would appear **Dr Buchanan** regarded the Arnatto as a recent introduction. The **Bixa** an American plant is now rapidly spreading over Bengal the inhabitants having found it a useful yellow dye which they employ to give their cloths a temporary colour in the *Dolyatra* or festival of Krishna. With this also they colour the water which on the same occasion they throw at each other with squirts. For these purposes it is well qualified as the colour easily washes out and the infusion has a pleasant smell. (Compare with facts given under **Abir**) By them it is called *Lotkan* and they say that before it grew commonly in the country the dry fruit was brought from Patna. Probably some other fruit was then brought and its use has been superseded by that of the **Bixa** to which the natives have given the old name, as there can be no doubt of its being an American plant and its fruit could scarcely have been brought here from the West Indies. In many parts it is called European Turmeric. (*Buchanan's Statistics of Dinajpur p 155*)

There seems no doubt whatever that both forms of the plant were originally introduced from America the white flowered form having in all probability been longer in India. While plentiful everywhere around gardens and villages it has nowhere gone wild and is thus scarcely naturalised in India. It was used as a source of war paint in the West India Islands and Brazil before the discovery of America.

Properties and Uses—

Dye—The pulp gives a beautiful flesh colour largely used in dyeing silks. It is altered by certain combinations into orange deep orange, or red the brighter orange and red colours being obtained in combination with red powder of *Mallotus philippinensis*. The dye is exported to Europe mainly from the West Indies and is used chiefly to colour cheese and other edible articles such as chocolate &c. **Mr Lisboa** says that milk men sometimes use it to colour buffalo's milk so as to pass it off as cow's milk. (*Useful Plants of Bombay*)

PREPARATION OF THE DYE—It may be extracted from the seeds direct or the pulpy matter may by boiling be separated from the seeds and made into cakes like those of lac or indigo. In this form it is generally sold in Europe. "The mode in which it is obtained is by pouring hot water over the pulp and seeds and leaving them to macerate and then separating them by pounding with a wooden pestle. The seeds are removed by straining the mass through a sieve and the pulp being allowed to settle the water is gently poured off and the pulp put into shallow vessels, in which it is gradually dried in the shade. After acquiring a proper consistence it is made into cylindrical rolls or balls and placed in an airy place to dry after which it is sent to market. It used to be most common in this form of small rolls each 2 or 3 ozs in weight, hard, dry, and compact, brownish without and red within. The other process

DYE.
524Butter and
Cheese dye.
525Rolls
526

B 526

| BIXA Orellana | The Arnatto Dye |
|------------------|---|
| Cakes 527 | <p>of manufacture is that pursued in Cayenne. The pulp and seeds together are bruised in wooden vessels and hot water poured over them they are then left to soak for several days and afterwards passed through a close sieve to separate the seeds. The matter is then left to ferment for about a week when the water is gently poured off and the solid part left to dry in the shade. When it has acquired the consistence of solid paste it is formed into cakes of 3 or 4 lbs weight which are wrapped in the leaves of the banana and known in commerce as flag Arnatto. This variety is of a bright yellow colour rather soft to the touch and of considerable solidity.</p> |
| Paint. 528 | <p>'Labat informs us that the Indians prepare an Arnatto greatly superior to that which is brought to us of a bright shining red colour almost equal to carmine. For this purpose instead of steeping and fermenting the seeds in water they rub them with the hands previously dipped in oil till the pulp comes off and is reduced to a clear paste which is scraped off from the hands with a knife and laid on a clean leaf in the shade to dry. Mixed with lemon juice and gum it makes the crimson paint with which Indians adorn their bodies (<i>Tropical Agriculture by Simmonds pp 388 89</i>)</p> |
| 529 | <p>EUROPEAN PROCESSES.—Regarding the extraction of the dye Ure writes 'Leblond proposed simply to wash the seeds of the Bixa till they are entirely deprived of their colour which lies wholly on their surface to precipitate the colour by means of vinegar or lemon juice and to boil it up in the ordinary manner or to drain it in bags as is practised with indigo. The experiments which Vanquelin made on the seeds of the Bixa imported by Leblond confirmed the efficacy of the process which he proposed and the dyers ascertained that the Arnatto obtained in this manner was worth at least four times more than that of commerce that moreover it was more easily employed that it required less solvent that it gives less trouble in the copper and furnishes a purer colour.</p> |
| 530 | <p>Arnatto dissolves better and more readily in alcohol than in water when it is introduced into the yellow varnishes for communicating an orange tint.</p> |
| 531 | <p>CHEMICAL REACTIONS.—The decoction of Arnatto in water has a strong peculiar odour and a disagreeable taste. Its colour is yellowish red and it remains a little turbid. An alkaline solution renders its orange-yellow clearer and more agreeable while a small quantity of a whitish substance is separated from it which remains suspended in the liquid. If Arnatto be boiled in water along with an alkali it dissolves much better than when alone and the liquid has an orange hue. The acids form with this liquor an orange-coloured precipitate soluble in alkalis which communicate to it a deep orange colour. The supernatant liquor retains only a pale yellow hue' (<i>Ure's Dictionary</i>)</p> <p>SPECIAL OPINION.—'The pulpy part of the seed forms the arnatto of commerce. It is imported into England from Mexico Brazil, &c in two forms—in masses of 5 to 20 lbs and as a homogeneous paste in casks of 4 to 5 cwt. The paste has the consistence of butter and the odour of urine which it is stated is added to keep it moist and improve the colour. At Cayenne where the dye is largely manufactured, the ripe fruit is crushed and allowed to remain in water for several weeks. The mixture is then strained through coarse cloth on the liquor standing the colouring matter gradually settles. This is then collected and evaporated until it is of a pasty consistence. Improvements have been introduced in the manufacture and the seeds instead of being crushed are washed with water and fermentation stopped by some reagent. The colouring matter yielded by this method is in a fine state of division and is known as Bixin. It is made into tablets. The colouring matter of arnatto is</p> |

| The Blumea. | BLUMEA aurita |
|--|--|
| <p>stated to consist of two colouring principles—<i>orellin</i>, which is yellow soluble in water and which gives a yellow colour to cloth when mordanted and <i>brasin</i> which when pure forms a cinnabar red powder insoluble in water but easily dissolved by alkaline solutions Arnatto is employed only to a limited extent in dye works but it is often used to colour varnishes cheese butter &c (Surgeon C F H Warden Prof of Chemistry Calcutta)</p> | |
| <p>MORDANTS AND AUXILIARIES—The mordant used with arnatto is most frequently crude pearl ash the alkali facilitates its solution but the quantity of alkali used must be regulated according to the depth of colour required The colour is however fleeting it is chiefly used for silk and seldom or never for woollen fabrics After dyeing the silk with arnatto the colour may be deepened or reddened by means of vinegar alum or lemon juice The Manipuris are said to use the fruit of <i>Garcinia pedunculata</i> for this purpose a fruit which it is reported has at the same time the power of fixing the colour This statement requires confirmation since the dye is generally regarded as fleeting The leaves of <i>Symplocos grandiflora</i> are used in Assam as a mordant with this dye (G Mann Esq) The yellow tendency of the colour produced through alkalis may be reduced on the addition of acids the more natural red being produced and restored again by further treatment with alkalis Arnatto is entirely insoluble in acids the colouring matter being precipitated hence the necessity of using an alkali as the solvent as a first stage in the process of dyeing Dr McOann says The bark of this plant is used in Kuch Behar as a mordant in dyeing with Morinda</p> | 532 |
| <p>Fibre—Bark yields a good cordage (<i>Dymock</i>) This is said to be used in the West Indies</p> | Bark 533 |
| <p>Medicine—Astringent and slightly purgative also a good remedy for dysentery and kidney diseases The pulp (a well known colouring matter) surrounding the seeds is astringent (<i>Roxburgh</i>) The seeds are cordial astringent and febrifuge (<i>Lindl</i>)</p> | FIBRE 534 MEDICINE Seed pulp 535 Seeds 536 |
| <p>Structure of the Wood—Wood pinkish white soft even grained</p> | TIMBER |
| <p>The friction of two pieces of this wood is said to readily produce fire for this purpose it is used by the West Indians</p> | 537 Tinder 538 |
| <p>Bloodwood, Indian, or Jarul, see Lagerstroemia Flos Regiæ, Retz LYTHRACEÆ.</p> | |
| <p>BLUMEA, DC Gen Pl II 289</p> | 359 |
| <p>A genus of annual or perennial woolly or pubescent herbs belonging to the COMPOSITÆ This may be regarded as the Groundsels of India; they are only separable from LAGERRA by the tailed anther-cells Leaves alternate usually toothed or lobed Heads corymbose panicle or fasciated rarely racemed heterogamous disciform purple rose or yellow outer flowers many-seriate female fertile filiform 2 3 toothed disk flowers hermaphrodite few fertile tubular and slender limb 5 toothed Involucre ovoid or campanulate bracts many-seriate narrow acute soft or herbaceous outer smaller receptacle flat naked Anther bases sagittate, tails small slender Style arms of hermaphrodite flowers flattened or almost filiform rarely connate with the adjoining anthers Achenes small subterete or angled ribbed or not pappus 1-seriate slender often caducous</p> | |
| <p>The genus contains about 60 species natives of tropical and sub-tropical Asia Africa and Australia It is named in honour of the distinguished Dutch botanist Dr Blume who in 1828 published a <i>Flora of Java</i> Dr Dymock says that in Bombay the vernacular name <i>Bhamburda</i> is applied to all Blumeas</p> | |
| <p>Blumea aurita, DC, see Lagergera aurita, Schulz Bip COMPOSITÆ</p> | |

| BLUMEA eriantha | Ngai Camphor |
|---------------------------------|---|
| 540 | Blumea balsamifera, DC Fl Br Ind, III 270 Syn. — <i>CONYZA BALSAMIFERA</i> Linn Vern — <i>Kakaródd</i> HIND <i>Kalahad</i> GUJ <i>Bhamaruda</i> MAR <i>Pon ma thein</i> BURM Habitat —A sub-bushy plant met with on the tropical Himálaya from Nepal to Sikkim altitude 1000 to 4000 feet extending to Assam Khásia Hills Chittagong Burma and the Straits Botanic Diagnosis —A tomentose or villous woolly plant, stem tall corymbosely branched above leaves 4 8 inches coriaceous elliptic or oblanceolate, usually silky above, serrate sometimes pinnatifid narrowed into a usually auricled short petiole heads $\frac{1}{2}$ $\frac{1}{2}$ inch sessile or peduncled in rounded clusters on the stout branches of a large spreading or pyramidal panicle involucre bracts tomentose receptacle glabrous achenes 10 ribbed silky, pappus red This belongs to the fifth section of the genus which is characterised by having numerous heads large or small forming narrow or broad terminal branched corymbs or panicles Shrubs or small trees with large leaves Medicine —The whole plant smells strongly of camphor which may indeed be prepared from it A warm infusion acts as a pleasant sudorific and it is a useful expectorant in decoction |
| MEDICINE Plant 541 | B densiflora, DC Fl Br Ind, III 269 THE NGAI CAMPHOR Syn — <i>B GRANDIS</i> DC Vern — <i>Pung ma theing phum masin</i> BURM Habitat —Found in the tropical Himálaya from Sikkim to Assam Mishmi the Nagá Hills and the Khasia Mountains also met with in the Tenasserim province of Burma Botanic Diagnosis —Stem stout panicle and leaves beneath densely tomentose or clothed with thick white felted wool leaves 8 18 inches broadly elliptic or elliptic lanceolate narrowed into a long winged some times appendaged petiole puberulous above serrate toothed or pinnatifid heads $\frac{1}{2}$ inch diam Sessile in rounded clusters on a large branched panicle involucre bracts narrow rather rigid receptacle narrow glabrous corolla lobes of hermaphrodite flowers hairy achenes 10-ribbed pubescent, pappus red This belongs to the same section as the preceding species Properties and Uses — Camphor —A few years ago Mr E O Riley prepared Camphor from this plant which was pronounced identical with that imported from China For further particulars see Camphor |
| CAMPHOR 543 | B eriantha, DC Fl Br Ind, III, 266 Botanic Diagnosis —Pubescent or tomentose or clothed with scattered long hairs rarely silky villous stems 1 foot slender dichotomously branched from the base leaves 1 3 in acutely and irregularly toothed lower petioled obovate obtuse, upper sessile obovate or oblong acute heads small, $\frac{1}{2}$ $\frac{1}{2}$ in mostly on the long slender peduncles of dichotomous cymes rarely fascicled peduncles and involucre clothed with long silky hairs receptacle glabrous achenes very minute, angles obtuse sparingly silky This belongs to the fourth section of the genus or Blumeas with few heads rarely many $\frac{1}{2}$ $\frac{1}{2}$ in usually peduncled and forming loose axillary and terminal corymbs often clustered Pappus white Properties and Uses — Medicine —A specimen of what appears to be an extreme form of this species (or a new and undescribed species) was forwarded to me for |
| MEDICINE 545 | B 545 |

Indian Groundsel.

BLUMEA
lacera

identification by Dr Dymock of Bombay It is an erect plant with curious tufts of woolly hairs at the bottom of the stem It appears that in Bombay the plant is used as a flea or insect powder (see *B. lacera*)

Blumea lacera, DC Fl Br Ind, III, 263

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Vern.—*Kakrōnda kukkurbānda jangli-muli* HIND *Kukursungā bura suksung* BENG *Nimurdi* BOMB ; *Jangli kāsni jungli mulli dīvari mulli* DUK *Narak karanda kattu mullāngi* TAM *Kare-pōgāku adai mulāngi* TEL *Kukuradru* SANS ; *Kamafistis* ARAB *Mai yagān* BURM *Kakrōnda* and other vernacular names are applied to more than one allied species of *Blumea* and *Laggera* without much regard to the colour of their flowers (*Moodeen Sheriff*)

Habitat—A common weed throughout the plains of India from the North West (ascending to 2000 feet in the Himālaya) to Travancore Singapore and Ceylon

Botanic Diagnosis—This species is placed by the *Flora of British India* in the second section or species with many villous heads $\frac{1}{2}$ $\frac{1}{2}$ in in diameter the heads being more or less clustered and forming dense oblong spikes or contracted panicles at the top of the stem only exceptionally arranged in loose open corymbs It smells strongly of turpentine a character which when taken along with the glabrous receptacle and yellow flowers readily separates it from its nearest allies

Stem erect simple or branched very leafy leaves petioled obovate toothed or serrate rarely lobulate heads $\frac{1}{2}$ in in short axillary cymes and collected into terminal spiciform panicles rarely corymbose involucre bracts narrow acuminate hairy receptacle glabrous corolla yellow lobes of the hermaphrodite flowers nearly glabrous achenes sub 4 gonous not ribbed glabrate

The above diagnostic characters have been reproduced from the *Flora of British India* in the hope that they may enable economic botanists to remove the ambiguity which still rests on the species of *BLUMEA* used for medicinal purposes The yellow flowers of this species should at once separate it from *Laggera aurita*, with which it has been confused Dymock says of the Bombay drug I am inclined to identify *kakrōnda* with *B lacera* This opinion is supported by the fact that the author of the *Mukhsan* describes the flowers of *kakrōnda* as yellow Moodeen Sheriff refers *kakrōnda* to *Blumea (Laggera) aurita*, a plant with pink flowers Through the kindness of Dr Dymock however I had the pleasure of examining a specimen of the plant which he viewed as *B lacera* and regarding which he contributed a note to the *Pharmaceutical Journal June 7th 1884* Along with my friend Mr O B Clarke I have carefully examined this Bombay plant and it appears to be a new species of *Blumea* not yet described or an extreme form of *B eriantha*, DC It is certainly not *B lacera* DC and accordingly the vernacular names and economic information as far as Bombay is concerned should be removed from this position It does not follow however, that the *kakrōnda* of Madras or of other parts of India is the same as in Bombay and accordingly it has been deemed advisable to retain, for the present the economic information in this position

Medicine—*Kakrōnda* is used as a febrifuge and also to stop bleeding being regarded as deobstruent and stimulant Mixed with black pepper it is given in cholera An astringent eye wash is made from the leaves

B lacera is a perennial plant with obovate deeply serrated leaves and yellow groundsel like flowers the whole plant being thickly clothed with long silky hairs The natives of the Konkan near Bombay call it *Nimurdi* and make use of it to drive away fleas and other insects 150 lbs of the fresh herb in flower was submitted to distillation in the usual manner with water and yielded about 2 ounces of a light yellow

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Boat- and Ship-building Woods

essential oil having a specific gravity of 0.9144 at 80° F and an extra ordinary rotating power 100 mm turning the ray 66° to the left **Mr D S Kemp** who made the observation checked it by examining a 10 per cent solution in alcohol which gave 6.6

This *Blumea* is of interest as the possible source of an insect powder I am forwarding a supply of the plant and a specimen of the oil to **Mr Holmes** for experiment and also for identification as the genus is a difficult one (*Dymock in Pharm Four June 7th 1884*)

Special Opinions —§ The expressed juice of the leaves is a useful anthelmintic especially in cases of thread worm either taken internally or used locally (*Surgeon F Anderson M B Bijnor*) Used by many Hospital Assistants and highly thought of by them as a febrifuge and astringent "Is an invaluable remedy in *Tinea tarsi* The juice of the fresh leaves is used as *Kajole* after removing the scales from the roots of the eyelashes (*Asst Surgeon Bolly Chand Sen Campbell Medical School Sealdah Calcutta*) The fresh root held in the mouth is said to relieve dryness (*U C Dutt Civil Medical Officer Serampore*)

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BOAT- AND SHIP-BUILDING—Woods used for A

further list of woods of this nature see CANOES

Acacia arabica
Albizia Lebbeck (in South India for boats)
Alseodaphne, sp
Amoora Rohituka and *spectabilis*
Anacardium occidentale
Anogeissus latifolia (ships)
Artocarpus hirsuta (ships)
Barringtonia acutangula
Bassia latifolia (country vessels)
B longifolia (ships keels)
Beilschmieda Roxburghiana (boats)
Berrya Ammonilla (used in Madras for masula boats)
Calophyllum inophyllum (masts spars)
C polyanthum (masts spars boats)
C spectabile (masts spars)
Capparis aphylla (knees of boats)
Carapa moluccensis (native boats)
Cassia siamea
Celtis australis (oars)
Ceriops Candolleana (knees of boats)
Cinnamomum glanduliferum (boat building)
Cordia Myxa (boat building)
Dalbergia Sissoo (boats)
Dillenia indica
D pentagyna (ships)
Dolichandrone stipulata (oars and paddles)
Drimycarpus racemosus (boats)
Dysoxylum Hamiltoni (boats)
Eriolana Candollei (paddles)
Eucalyptus Globulus (ships)
Fagraea fragrans (boats, archors)

Fraxinus floribunda (oars)
Gmelina arborea (boats)
Grewia oppositifolia (oar shafts)
G tiliaefolia (masts oars)
Heritiera littoralis (boats)
Hibiscus tiliaceus (light boats)
Hopea, sp (boat hulls)
Kydia calycina (oars)
Lagerstroemia Flos Reginae (ship building boats)
L microcarpa (ships)
Melanorrhoea usitata (anchorstocks)
Melia Azadirachta (ships)
Miliusa velutina (oars)
Morus cuspidata (boat oars)
Nectandra Rodiaei (ships)
Pentace burmanica (boats)
Pinus longifolia (bottoms of boats)
P Merkusii (mast pieces)
Podocarpus bracteata (oars masts)
P latifolia
Polyalthia cerasoides (boats)
Populus euphratica (boats)
Pterocarpus Marsupium (boats)
Salvadora oleoides (knee timbers of boats)
Sandoricum indicum (boats)
Shorea robusta
S stellata (boats)
Swietenia Mahagoni (ships)
Swintonia Schwenckii (boats)
Tectona grandis (ships)
Terminalia tomentosa (boats)
Thespesia populnea (boats)
Vateria indica (masts of native vessels)
Xylin dolabriformis (boats)

B 548

The Urticæ

BÆHMERIÆ.

BÆHMERIÆ

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An important tribe of fibre yielding plants belonging to the Natural Order URTICACEÆ in the sub order URTICÆ. To enable the reader to understand the position of the BÆHMERIÆ in the following pages will be found a brief account of the properties and uses of the URTICÆ as a whole and an analysis of the genera followed by a more detailed account of the BÆHMERIÆ and of the genus BÆHMERIA itself.

Affinities of the Urticæ

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These may be popularly defined as the Nettle family. They have of course their closest affinities to the other sub orders of the URTICACEÆ but as pointed out by Weddell they may also be viewed as having many affinities to the TILIACEÆ just as EUPHORBIACEÆ may be regarded as approaching the structural peculiarities of MALVACEÆ. To the general observer the coarsely serrate hairy and opposite leaves of URTICÆ suggest a strong external resemblance to many LABIATÆ. The affinity to TILIACEÆ is however more than in mere external appearance since URTICACEÆ and TILIACEÆ may be viewed as affording the great majority of our bast or liber fibres such as Flax Rhea Jute &c. This indicates a structural agreement which is fully illustrated by many other characters such as the form venation and corrugation of the leaves the stipules definite inflorescence valvate æstivation 2 lobed anthers and smooth pollen. Of the URTICACEÆ the sub order URTICÆ bear out this resemblance in the most marked degree.

Habitat of the Urticæ

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The URTICÆ are chiefly tropical as far as the distribution of genera is concerned. Europe is poorest in species and so in India are the temperate altitudes of the HIMALAYA. But what is lost in the number of genera is compensated for by the great prevalence of individuals. URTICÆ and PARIETARIA follow closely the haunts of man in the temperate regions and in these situations cover relatively as much space as do the more numerous forms which inhabit the tropical and extra tropical regions.

Economic uses of the Urticæ

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But for the valuable fibres obtained from URTICÆ the properties of the whole sub-order might be described as unimportant. The stinging hairs have been used as counter irritants. There is little to justify the belief in the virtues of the calcareous salts contained in many nettles or of the nitrate of potash in the pellitories. The young twigs of certain species of URTICA, POUZOLZIA, DEBREGEASIA and ELATOSTEMA are eaten as pot herbs to a small extent as are also the tubers of *Pouzolzia tuberosa*. From an industrial point of view however the liber fibres are exceedingly valuable. The various species of BÆHMERIA but more particularly *B. nivea*, yield the rhea fibre of commerce—a fibre which we are accustomed to hear requires only the aid of some contrivance by which it can be conveniently and cheaply separated from the bark and deprived of its gummy substance to become one of the most valuable textile fibres in the world. Next in importance may be mentioned the fibres from the species of VILLEBRUNEA the *Bon rhea* of Assam after these MAOUTIA the *Poya* fibre the fibres derived from the species of GIRARDINIA or Nilgiri Nettles and those from URTICA the true Nettles. All these and probably many others are deserving of an extended investigation for there seems every likelihood that sooner or later one or more of them will meet the demand for new textile fibres. For cordage there are several deserving of the most careful examination such as the fibres of DEBREGEASIA, ELATOSTEMA

BØEHMERIÆ.**The Urticæ,**

FORSKØHLFA GIRARDINIA, LAPORTEA PILFA, POUZOLZIA and SARCO CHLAMYS

The subject of rhea fibre has been before the public since Roxburgh first drew attention to it in 1811. Many important experiments have been performed but at the present moment the enquiry might not ~~inaccu~~ accurately be described as paralysed through the hitherto insurmountable obstacle which the tenacity of the fibre has offered together with the difficulty of freeing it from the gummy substance. It would seem however that a serious mistake has been made in not having coincidently with these mechanical experiments instituted a thorough enquiry into the subject of the allied species which afford rhea or nettle fibres of varying economic value. *Spons Encyclopædia* justly remarks. Much remains yet to be done in identifying the various BØEHMERIÆ which cover a very wide range and in deciding which species or varieties will yield the most and best fibre adapted to Western wants (*p* 932). There are some 18 forms of BØEHMERIÆ itself found in a wild state in India and including all the allied genera there are no less than 45 species of plants most of which doubtless yield fibres—45 plants so closely allied that they are all popularly viewed as wild forms of rhea. There are also 10 nettle plants which yield fibres and in addition 31 fibre yielding plants related to the two great groups which may popularly be said to be represented by the Rhea and the Nettle. Thus belonging to the sub-order URTICÆ there are in India 70 or 80 fibre yielding plants all of which (with perhaps five or six exceptions) are utterly unknown to the European textile industries. This being so it would seem that had the experiments with rhea fibre been associated with a strict enquiry into the relative value of the fibres afforded by the entire sub order URTICÆ a rhea fibre plant might have been discovered which would have rendered expensive and complex machinery unnecessary. (See *Bon rhea* first para under **B nivea**.) Anticipating this to be the line of enquiry likely to be taken up in the future the brief botanical analysis of the genera of URTICÆ which will be found in subsequent pages may be found useful. From the conflicting information in the writings of authors on Indian Economic science due to the species of URTICÆ not having been scientifically determined it is very much to be regretted however that the description of the fibres under each of these genera is so exceedingly imperfect.

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Structural variations of the Urticæ

The classification of the members of the URTICÆ depends upon variations in the following characters —

The **Stem** may be herbaceous erect or creeping, or it may be sub-fruticose or woody and even arborescent.

The **Leaves** may be opposite or alternate symmetrical or unsymmetrical at the base equal or unequal one being either very much smaller or even abortive producing in originally opposite leaves an apparently alternate condition. They may be penninerved 3-costate (*i.e.* 3 nerved from the base) 3 plicostate (*i.e.* two lateral nerves springing from the midrib so as to make the leaf appear 3 costate) or they may be 5-costate. The margin may be entire or variously toothed or incised. The surface may be glabrous or hairy and the hairs may be stinging or not it may be smooth bulate (*i.e.* corrugated or crumpled) or rough from the presence of variously shaped crystaloliths. The leaves are stipulate (except in some **PARIETARIÆ** where the stipules are rudimentary or abortive) the stipules may be free, one on either side of the petiole or interpetiolar (united into one between the petioles of opposite leaves) or intrapetiolar (*i.e.* axillary) free or united into an entire or more or less bifid ligulate body, the stipules may also be caducous or persistent.

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or Nettle Family

BCHMERIÆ.

The **Inflorescence** may be described as definite axillary cymes, solitary or grouped in the axils simple or ramified composed of simple or compound racemes or spikes or compressed into capitula symmetrical or unilateral. The axis or receptacle may accordingly be elongated, filiform or flattened or concave resembling the receptacle of the fig.

The **Flowers** are declinuous (i.e. unisexual and therefore either monoecious (on one plant) or dioecious (male flowers on one individual and female on another)] or they may be polygamous (i.e. declinuous and hermaphrodite flowers on the same individual plant). The flowers may be sessile and grouped together forming glomeruli or pedunculate the peduncle or pedicel having often one or two joints especially in the male flowers. The inflorescence may be naked or bracteate the bracts being either small or large and foliaceous free or connate often forming an involucre in the capitulate forms. The sepals are generally regular in the male flowers 5 4 3 or even 2 or 1 merous free or more or less connate valvate or imbricate. In the female flowers they are less regular and generally fewer in number and more frequently connate even when they are free in the male flowers.

The **Stamens** are generally of the same number as the sepals of the male flowers opposite and often uncoiling elastically in the female flowers they are occasionally represented by hypogynous staminodes or abortive stamens. When the perianth is adnate to the ovary a sort of perigynous condition is produced but the ovary is not strictly speaking inferior since the union of the perianth tube to it is only partial and easily separable.

The **Pistil** is rudimentary in the male flowers but the shape and form or hairiness of this rudiment is often of importance. In the females it varies considerably it is flat, smooth glabrous or granulated it is free from the perianth or united to it the persistent perianth tube often becoming succulent and causing the achene to appear like a drupe. The style may arise from the apex or not it may be short or long elongated or filiform or capitate and papillose or hairy.

ANALYSIS OF THE INDIAN GENERA OF
URTICEÆ

Tribe I Urereæ.—Herbs under shrubs rarely trees *with stinging hairs* and opposite decussate or alternate spiral leaves. Flowers in cymes male perianth 4 5 merous rarely 2 3 merous ovary rudimentary female perianth 2 5 lobed or partite *free from the ovary*.

* *Achene erect leaves opposite stipules lateral, free or united and interpetiolar*

1 **Urtica**.—Male perianth 4 merous exterior segments small *Stigma papillose-capitate*

** *Achene oblique leaves alternate stipules intrapetiolar (axillary) very frequently united*

2 **Fleurya**.—Annual herbs. Flowers glomerulate forming racemose spikes or panicles. Female perianth of 4 segments equal or unequal one large hooded and furnished with a stinging hair. *Stigma* ovate or linear.

3 **Laportea**.—Under shrubs or trees or perennial herbs. Flowers glomerulate paniced rarely racemes. Female perianth 4 lobed, equal or unequal persisting almost unchanged around the fruit reflexed. *Stigma* filiform.

4. **Grardima**.—Erect herbs or almost under shrubs. Flowers in glomerulate spikes or sub paniculate spikes, when fruiting covered with

I
STINGING
NETTLES.
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BOEHMERIÆ.

The Urticæ,

II
STINGLESS
NETTLES
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long stinging hairs *Female perianth* ovoid tubular bifid the upper lip 2 3 dentate the lower almost abortive *Stigma* subulate

Tribe II Procrideæ—Herbs rarely woody below *unarmed* (eg *hairs not stinging*) leaves opposite or by abortion *alternate* and then *often distichous* Flowers forming capitate cymes or arranged upon a discoid receptacle male perianth 4 5 merous rarely 2 3 merous ovary rudimentary female perianth 3 5 partite, *free from the ovary* Staminodes sometimes present

* *Leaves opposite one unequal or imperfect*

5 **Pilea**—Under shrubs or herbs erect or prostrate Flowers forming cymose capitula or lax racemes *Female perianth* 3 partite one large, hooded glandular or scaly staminodes often at the base of the sepals achene included with the succulent calyx or exserted *Stigma* short penicillate

** *Leaves alternate distichous unsymmetrical a large leaf usually alternating with a small bract like or abortive one*

6 **Elatostema**—Under shrubs or perennial or annual herbs Flowers collected on a regular or irregular discoid receptacle *Female perianth* small abortive or absent *Stigma* sessile—a brush of caducous hairs

7 **Procris**—Sub succulent and often epiphytic under shrubs erect usually glabrous Flowers males forming glomerules, arranged in lax cymes rarely capitula females capitulate collected upon a globose fleshy receptacle *Female perianth* small or 3 4 partite becoming fleshy and enclosing the ovary

III
STINGLESS
NETTLES
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Tribe III Boehmeriæ—Under shrubs or trees rarely herbs unarméd with opposite or alternate leaves Flowers collected into glomeruli or scattered ex involucrate or with small scarious bracts, forming axillary solitary or ramified spikes or cymes male perianth 4 5 merous rarely 2 3 merous ovary rudimentary female perianth most frequently tubular mouth contracted 2 4 toothed including and sometimes adherent to the ovary or very short or even absent

* *Fruiting perianth membranaceous or moist achene included free*

8 **Boehmeria**—Under shrubs leaves opposite or alternate Flowers monœcious or diœcious male and female in separate inflorescences constituting sessile glomeruli in the axils or forming secund spikes or arranged in branched panicles *Stigma* filiform persistent

9 **Chamabaina**.—A diffuse herb with opposite leaves Flowers forming axillary glomeruli *Stigma* ovate persistent

10 **Pouzolzia**—Herbs sometimes woody at the base leaves alternate rarely opposite Flowers occasionally diœcious arranged in axillary glomeruli or spikes in the monœcious forms male and female flowers are often on the same inflorescence male perianth 4 5 merous rarely 3 merous *Stigma* filiform deciduous

11 **Distemon**—Herbs with alternate leaves Flowers glomerulate arranged in simple spikes male perianth 2 merous rarely 3 merous *Stigma* linear deciduous

** *Fruiting perianth very often fleshy free or adnate to the achene*

12 **Sarcochlamys**—A shrub with alternate leaves rough above white tomentose below Flowers glomerulate forming axillary solitary or paired spikes, males lax females dense flowered male perianth 5 partite abortive Ovary lanate Fruiting perianth oblique accrete gibbous mouth contracted, lateral and dentate *Stigma* short penicillate

or Nettle Family

BCEHMERIA

*** *Fruiting perianth adnate to the ovary*

13. *Villebrunea*.—Under shrubs or trees with alternate leaves. Flowers dioecious forming capitulate glomeruli sessile in the axils of the leaves or fascicled lax dichotomous cymes fruiting perianth thin fleshy *Stigma* sub peltate sessile penicillate ciliate

14. *Debregeasia*.—Shrubs with alternate leaves. Flowers axillary sessile glomeruli or numerous cymes. Female perianth minutely toothed at the contracted mouth in fruit becoming succulent *Stigma* penicillate

**** *Female perianth minute or absent*

15. *Maoutia*.—An under shrub with alternate leaves. Flowers glomerulate small paniced. Female perianth minute or absent *Stigma* penicillate

16. *Phenax*.—Delicate under shrubs. Flowers glomerulate sessile in the axils bracts prominent ferruginous. Female perianth absent *Stigma* elongated

Tribe IV Parietariæ—Herbs or under shrubs rarely shrubs unarmed. Leaves alternate entire. Flowers diclinous or polygamous 1 3 rarely numerous included within an involucre of free or connate bracts bracts sometimes only 2. Female perianth tubular free

17. *Parietaria*.—Herbs often diffuse stipules small or absent. Cyme axillary 3 8 flowered androgynous or polygamous bracts free herbaceous involucre. Style elongated crowned with a papillose stigma

Tribe V Forskohleæ—Herbs with non stinging hairs leaves alternate or opposite. Flowers diclinous grouped in the axils of the leaves generally involucre. Male flowers irregular female perianth free from the achene which it completely encloses or absent

18. *Forskohlea*.—Under shrubs or tough herbs covered with hooked hairs leaves alternate more rarely opposite crenate or dentate stipules lateral free. Flowers contained within a campanulate or tubular involucre perianth of both males and females tubular below obtusely 3 dentate densely lanate within

19. *Droguetia*.—Differ from *Forskohlea* in the flowers being generally solitary or arranged in terminal spikes. Male perianth campanulate shortly toothed

Note.—For further information regarding the above genera consult their respective alphabetical positions

BCEHMERIA, Jacq Gen Pl, III., 387

A genus of URTICACEÆ comprising about 45 species of small trees or shrubs, inhabiting the sub-tropical and tropical regions of Asia and America. There are some 18 species met with in India, the most prevalent of which may be said to extend from Nepal through Sikkim to Assam the Khásia Hills Cachar Burma and Ceylon. Only three species can be said to be more generally distributed, reaching the outer North West Himalaya as far west as Garhwal and extending to the plains and lower hills of Western India, while none occur in plains and hills of the Panjáb proper.

Leaves opposite or alternate sprinkled with inconspicuous punctiform cystoliths equal or unequal dentate (very rarely 2 lobed) 3 nerved petiolate stipules axillary free or less frequently connate deciduous. Flowers minute, unisexual aggregated into elongated axillary solitary heads or clusters (glomeruli) scariously bracteate or forming axillary spikes or branching racemes or cymose panicles. Flowers monoecious or dioecious; male perianth 4 partite or lobed (very rarely 3 or 5 parted) lobes leafy ovate sub-acuminate or mucronate valvate in bud. Stamens 4, opposite the perianth lobes and inserted below the clavate or sub-globose rudiment of the gynoecium glabrous or shortly lanate at the base. Female perianth gamophyllous, tubular or saccate compressed or ventricose 2 4-dentate at the con

IV
STINGLESS-
NETTLES
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V
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BOEHMERIA
comosa**The Stingless Nettles,**

traced mouth *Ovary* sessile or stalked enclosed by the perianth tube and sometimes even adnate to it, tapering into the elongated filiform persistent style *stigma* papillose on one side of the style *ovule* orthotropous solitary sub-erect or ascending *Achene* enclosed in the mucrescent perianth and often cohering to it pericarp crustaceous and thin or nut like *albumen* more or less copious *cotyledons* of the fleshy embryo elliptical usually a little longer than the conical radicle

560 **Affinities of Boehmeria**—This genus belongs to the Tribe URTICEÆ and to the Sub tribe BOEHMERIEÆ the Boehmerieæ may be referred to four series of allied genera All the species of Boehmeria receive popularly the name of the Rhea or Grass-cloth fibre plants and indeed the bushy or herbaceous members of two or three other allied genera equally fall within that designation since they all yield delicate white silvery and exceedingly strong fibres It seems likely however that the true rhea fibre is the produce alone of **B nivea**

561 **B squamigera** has been formed into the genus CHAMABAINIA on account of the stigma being capitate instead of linear—a distinction which seems scarcely worthy of such importance the leaves are also opposite In POUZOLIA the style is filiform articulated and caducous and the fruit enclosed by the winged or costate calyx In Distemon the leaves are alternate the male flowers 2 merous rarely 3 merous and the stigma linear deciduous The members of these three genera with Boehmeria itself may be regarded as the series of true Rhea fibre plants—the Eubœhmeria of botanists characterised by having the tubular female perianth free or adherent to the ovary dry or membranous in fruit and with 2 or 4 apical teeth

562 In the second series Sarcoclamydeæ, the female calyx is free with a lobed or dentate mouth fleshy and succulent around the fruit In India we have only one species belonging to this series viz **Sarcoclamys pulcherrima** Gaud this is met with in Assam the Khâsia Hills Sylhet, Chittagong and Sumatra

563 In the third series Villebruneeæ, the following genera are represented in India Villebrunea 3 species Debregeasia, 3 species These are recognised by having the female calyx adnate to the ovary with a short dentate or sub-entire limb

564 The fourth series Maoutieæ, is characterised by the calyx being rudimentary or absent There is only one Indian species of any importance belonging to this series viz **Maoutia Puya**, Wedd the Poi fibre of Assam

Note—The above remarks regarding the various genera of Indian rhea fibre plants have been given in this place in the hope that they may prove useful to persons desirous of discovering the correct botanical sources of the fibres which in the different provinces of India go by the name of rhea For fuller details consult the genera mentioned in their respective alphabetical positions in this work and compare with brief botanic diagnosis of these genera already given in the preceding pages

565 **Boehmeria caudata**, Poir (non Swartz)

Syn—A form of **B platyphylla** P, Don and not a distinct species probably var **macrostachya**.

Habitat—A large shrub frequent in Chittagong and Ava (Kura)

Botanic Diagnosis—*Leaves* opposite sharply crenate-serrate stipules lanceolate, acuminate *Female perianth* elliptical obovate or roundish

FIBRE
566

B comosa, Wedd ; DC Prod , XVI, I., 205

Syn.—**B DIFFUSA** Wedd Kura For Fl Burm , II 423 U COMOSA Ham

B 566

or Rhea Fibre Plants.

**BœHMERIA
malabarica.**

Habitat.—A leaf shedding small shrub about 2-4 feet high, frequent in the mixed open forests all over Burma, ascending to 3,000 feet in altitude and extending west to the Khásia Hills Sikkim, and Nepal

Botanic Diagnosis —Leaves 2 6 inches long ovate lanceolate long acuminate crenate-serrate stipules linear lanceolate deciduous *Glomerules* axillary spicate *Female perianth* compressed lanceolate to obovate 2 4 toothed *stigmas* twice as long as the tube

FIBRE
567**Bœhmeria cuspidata, Bl (non Wedd)**

Habitat —Nepal

A species apparently of no importance and very little known

FIBRE
568**B Didymogyne, Wedd DC Prod XVI I, 204 Kurz II 423**

Syn —DIDYMOGYNE BœHMERIOIDES Wedd

Habitat —A herbaceous glabrous bush said to be found in Moulmein

Botanic Diagnosis —Leaves alternate 2 4 inches long crenate-serrate from the middle *Female perianth* becoming oblong narrowed upwards, enclosing 2 carpels each with a distinct style (according to Weddell)

FIBRE
569**B Helferu, Bl DC Prod XVI I 204 Kurz II 423**

Habitat —A bush with branches having adpressed pubescence met with in Tenasserim (*Kurz Burm Fl II 423*)

FIBRE
570**B lobata**

The *ullah* sold for hemp at Almora and is common in Garhwál and Kumaon (*Baden Powell*) I have been unable to recognise the plant referred to by **Mr Baden Powell** but it must be of considerable importance since it is mentioned by several writers upon Indian Economic Science The name **B lobata** does not occur in botanical works

FIBRE
571**B macrophylla, Don Brandis For Fl 403**

Syn —URTICA PENDULIFLORA Wall

Vern —*Saachala golka* KUMAON *Kamlu* NEPAL

Habitat.—This broad leaved shrub is met with from Kumaon eastward through Nepal and Sikkim to the Khásia Hills, altitude 4 000 feet Flowers in August to September

Botanic Diagnosis —Branches 4 angled with short adpressed hairs *Leaves* opposite long lanceolate pustulate rugate above the pustules terminated by a gland softly pubescent beneath obtusely serrate 3-costate the lateral nerves extending through little more than the lower half the remainder penninerved from the midrib stipules lanceolate, hairy on the midrib petioles strigose 1 in long *Flowers* monœcious in long drooping axillary spikes the clustered flowers in the axils of lanceolate bracts

Fibre.—Its bark yields a beautiful fibre much prized for fishing nets

572

FIBRE.
573
574**B malabarica, Wedd DC Prod XVI, I, 203 Kurz, For Fl, Burm, II 422**

Syn.—URTICA MALABARICA Wall

Vern.—*Takbret* LEPCHA *Maha-doya-dul* SINGH

Habitat.—A shrub 4 feet in height or sometimes a small tree 20 feet high, met with in the Carnatic the Konkan Sylhet the Khásia mountains and lower Himálaya, extending to the tropical forests of Arracan Plentiful in the moister tropical and extra-tropical forests of India and Burma; very common in Ceylon

BOEHMERIA
nivea,**Rhea Fibre.****FIBRE**
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Fibre—The liber yields a strong fibre **Kurz** says 'The liber of this and of most *Boehmerias* yields a strong fibre.' **Thwaites** says that the Singhalese make fishing lines from the fibre

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***Boehmeria nivea*, Hook & Arn** *Wight, Ic t 688; Hooker's Jour Bot, III (1831), 315, t 8*

Syn.—*URTICA NIVEA* Linn var *CANDICANS* Wedd in *DC Prod XVI I 207* *B TENACISSIMA* Gaudich *B CANDICANS* Hassk *URTICA CANDICANS* Burm *U TENACISSIMA* Roxb *Fl Ind Ed C B C 656*

References—*Brandis For Fl 402* *Spons Encyclopædia 921* *Drury U P 81* *Atkinson's Him Dist 797* *Baden Powell's Pb Prod I 503* *Hem Chunder Kerr's Report on Jute pp 45* *Lindley and Moore's Treasury of Botany Report on Rhea Fibre by Dr Forbes Watson 1875* reprinted with a lecture 1884 *Rhea* by *W H Cogswell Agri Hort Soc of India Vol VII Part II 1884* *The Fibrous Plants of India* *Dr Royle 1855, Cyclopædia of India* *Dr Balfour The Ramie Theo Moerman, The Indian Forester Feb 1884* *The Tropical Agriculturist Feb 1884* *Records of Govt of India Rev and Agri Dept*

Comm. Names—*RHEA* CHINA GRASS *Fng* *RAMIE* *ORTIE* *BLANCHE* *SANS DARDS* *DE CHINE* *Fr* *RAMEH* *RAMIE* *Java Malay*

Vern—*Schou* or *schu* or *tchou* (the plant) *schou ma* (fibre of the schou) *CHINESE* *Tsjo siri so mao karao akaso* *JAP* *Klooi, caloe* *ghons* *SIAM* *AND SUM* *Kankhura* *BENG* *Rhea* *Ass* *Poah* *NEPAL* *Goun* *BURM*

For *Bon rhea* Ass see *Villebrunea appendiculata*, *Wedd DC Prod XVI I 235²⁶* **Kurz** regards the *Bon rhea* as the China grass cloth which would thus be quite distinct from the Rhea fibre proper. If this be correct we have in India been trying to produce from the wrong plant a fibre to compete with the Chinese grass cloth. This might account for the fact that the samples of Indian rhea fibre exported to Europe have uniformly been pronounced inferior to the China fibre. It seems highly desirable that the grass-cloth of China should be carefully looked into with the object of confirming the opinion which generally prevails that it is obtained from the same species as the Rhea fibre of India. (*Compare with pages 461 and 469*)

Habitat.—A shrub indigenous in India, and probably also in China, Japan and the Indian Archipelago

Botanic Diagnosis—*Branches* teret herbaceous and with the petiole tomentose from long soft spreading hairs. *Leaves* alternate broad ovate 3-6 in long acuminate dentate with large triangular slightly curved teeth base truncate and tapering suddenly into the petiole which is half the length of the blade or longer upper surface of the leaf rough pubescent the under white densely matted with closely adpressed hairs. *Flowers* green monœcious in axillary panicles panicles in pairs shorter than the petiole bearing numerous sessile flower heads along their entire length. *Female panicles* lax branched with rounded glomeruli (covered with the long styles) occurring in pairs in the axils of the upper male in the axils of the lower leaves. *Style* much exserted hairy. *Ovary* enclosed completely by the tubular, hairy 4 toothed female perianth

Many unfortunate mistakes occur in the literature of this species, some of which have greatly tended to retard the development of the rhea fibre industry. The plant has been confused with many other widely different species. **Baillon** for example, in his *Natural History of Plants* Vol III p 503 gives an illustration of a plant which apparently by mistake is said to be *B. nivea* the leaves are opposite instead of alternate and the inflorescence is not that of this species. *The American Agriculturist*, January 1884 reproduces an old plate of *Manotia Puya* as an illustration of *Boehmeria nivea*, &c

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RHEA FIBRE.

CULTIVATION AND PREPARATION

Where Cultivated.—Assam Eastern and Northern Bengal also in Saharanpore and Calcutta Botanic Gardens introduced by Agri Horticultural Societies into Madras and Rangoon for experimental purposes

It has also been cultivated in Natal Mauritius, Algeria in the Island of Corsica South France the Channel Islands and even in Great Britain

Soil—The rhea plant is exceedingly hardy and thrives in almost any description of soil But preference should be given to a rich light sandy loam well worked and sufficiently shady The subsoil should be good, as the roots penetrate 12 to 14 inches deep in search of nutrition

Climate—For profitable working a situation should be chosen which would promote the quickest growth of the stems and yield the greatest number of cuttings with the best quality of fibre A situation fulfilling these conditions would most probably be found in a tropical climate with a moist atmosphere and fairly good rainfall It would succeed in almost any part of the tropical plains of India

Preparation of the Soil—The land if not naturally rich should be manured it should also be ploughed to a considerable depth and tilled lightly so as to remove the weeds Furrows or small trenches 3 feet apart should then be made and the land kept ready to receive rhea roots or cuttings by the end of the rainy season An analysis of rhea shows that the most favourable manure should contain nitrate of soda sea salt and lime Valuable information as to the cultivation of the grass cloth plant in China and the extraction of the fibre appears at pages 359-362 of *Dr Forbes Royle's Fibrous Plants of India* 1855 having been translated from a Chinese treatise into French by M Stanislas Julien and retranslated into English by Dr Royle

Planting and Care of the Crop—Rhea is easily propagated It grows readily from root or stem cuttings and from seed Supposing the mode of propagation by root-cuttings to be adopted the young lateral shoots with their roots should be cut off and planted in furrows before the end of the rainy season to a depth of 3 inches a little watering may be necessary should the weather be dry It will be found that plants will grow rapidly to a height of 4 or 5 feet that the roots will become stronger every year the plant being perennial The first crop may be ready in two months from the date of planting out especially in favourable situations There are many advantages in a rhea crop it is perennial and does not therefore require to be renewed every year It resists variations in temperature owing to the roots penetrating into the subsoil Year by year the roots spread becoming stronger and more productive The crop is never destroyed by caterpillars or other insects owing to the quantity of tannin which the bark contains and lastly three or four cuttings may be taken off the same ground every year But it has a serious disadvantage in that it is one of the most exhausting crops known, requiring the land to be left fallow before anything else can be put on the same field after the removal of the crop

Cutting the Rhea—Some experience is necessary to decide the right time for cutting As a general rule care should be taken to effect the cutting before the plant becomes covered with a hard or woody bark the formation of which is indicated by the green skin turning brown the discoloration commencing at the bottom of the stem A practical way of finding whether the plant is ready for cutting is to pass the hand down the stems from top to bottom If the leaves break off crisply, a crop of cuttings may be taken off the plants Dr Forbes Watson says that the

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nivea.****Rhea Fibre.****CULTIVA
TION**

plants are ready for cutting when $3\frac{1}{2}$ to 4 feet in height. If the length is not more than 2 feet the fibre is very fine but the chances are you get more waste and not such a good percentage of fibre. In the long stems the fibre is not so fine as in the medium ones. Care should be taken however not to remove more than can be treated for extraction of the fibre within the 24 hours. Experience says **Mr Theo Moerman** "has enabled us to establish the fact that the fibre of the second cutting is superior to the first and that in every instance it is preferable to cut the stalks before the plant flowers and before it is completely mature in order to obtain a finer and softer fibre."

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Outturn and Cost of Production—About four or five cuttings can be had from the same ground a year. The best crops are those cut in June to August the February crop yields the strongest fibre. **Major Hannay** reported that in Assam the average crop of one Assam *poorah* (14 acres) well manured and with a full crop of stems or reeds was from 10 to 12 maunds (*Calcutta Review* 1854). But he omitted to explain whether this was the weight of stem or of fibre or whether it was the yield of one or more cuttings. Another writer in the *Review* added however to this statement the notice of an experiment made in the vicinity of Calcutta in 1854 and said: "A plot of ground containing 550 square yards gave on an average cutting 301½ lbs of sticks from which was obtained 11 lbs of fibre. Now 550 yards is almost one ninth of an acre but not to overstate the returns this may be estimated at one eighth. Hence $11 \times 8 = 88$ lbs per acre which again multiplied by 4 the number of cuttings would give yearly per acre 352 lbs of fibre."

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Dr Forbes Watson says: "I am aware that there are some notable statements which have been founded upon experiments made in Algiers. Estimates have been made showing that you could get forty tons per acre but I think these require to be verified before we can accept them. Anyway I do not see that we can conclude at the present—I hope I shall be mistaken—that each crop will yield more than 250 lbs per acre. You may however obtain three crops or even four in the year which would bring it to 1 000 lbs per acre." **Theo Moerman** in his little book on *The Ramie* says that the annual yield of fibre per acre is five or six times greater than the quantity which the cotton plant produces in the best seasons and in the most favourable climates. **Mr J Bruckner** of New Orleans estimated from personal experience that each cutting of the Ramie after the plant has reached the height of 3 or 4 feet produces from 600 to 800 lbs of retted disintegrated fibre per acre. Supposing the crop in question to give three cuttings in the year the total outturn per acre would be from 1 800 to 2 400 lbs of fibre. **M Edouard Nicolle** of Jersey however affirms (says **Mr Moerman**) that in his Ramie plantations he obtains annually at Jersey three crops which yield a total of 11 250 lbs of raw fibre (or bark separated from the centre wood of the stalks) which gives him from 5 000 to 7 875 lbs. of fine fibre ready to be combed out and used in filatures. There must apparently be some mistake for further on **Mr Moerman** makes **M Nicolle** say that he obtained a total annual return of 5 625 lbs of the fibre containing bark which are equal to a minimum of 3 375 lbs of well retted and thoroughly-cleaned fibre ready for use at filatures.

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In China according to *Spons Encycl* (p 922), The stems are gathered for industrial purposes in the first year when about 1 foot high. In the tenth month of every year before cutting the offsets the ground is covered with a thick layer of horse or cow dung in the second month the manure is raked off to allow the new shoots to come up freely. In the second year the stems are again cut. At the end of three years the roots are very strong, and send up many shoots. Cropping then takes place

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three times a year the stems being cut when the suckers from the root stock are about $\frac{1}{2}$ inch high. The first harvest is got in at about the beginning of the fifth month, the second in the middle of the sixth or beginning of the seventh month, and the third, in the middle of the eighth or beginning of the ninth month. The stems of the second crop grow fastest and yield the best fibre. After the crop the stocks are covered with manure and immediately watered. A well-cared for plantation lasts for 80 to 100 years. The principal points to be investigated in order to determine the best methods of growing the plants on a commercial scale are as follows: (1) Influences of irrigation and manuring especially the effect of returning to the soil the waste portions of the plant. (2) The variation of the amount and quality of the fibre according to the season. (3) The comparative quality of the fibre of short stems (3 feet) and that of full grown stems (5-8 feet). (4) The effect of the density of growth upon the thickness and the straightness and branchiness of the stems and upon the yield per acre especially in connection with the prospect of a greater number of crops annually and the condition of limited height. (5) The best and cheapest methods of gathering, stripping and sorting the stems.

Separation of Fibre—The modes by which this is accomplished by manual labour and by machinery will be found under another heading (see page 642) but it may not be out of place to say something here as to the condition of the stems most favourable for the extraction of the fibre. They require to be acted upon while green and at most within a few hours after they are cut. **Major-General Hyde** who presided at a meeting of the Society of Arts (London 12th December 1883) at which **Dr Forbes Watson** delivered a lecture on Rhea with special reference to Messrs Death and Ellwood's patent Universal Fibre extractor in summing up the discussions which followed the lecture while referring to certain experiments performed by **Mr Greig** said: "The fibre was placed in a shed and remained there until Monday morning and on Monday morning the mass as high as that table was like a large mass of isinglass glued up together with the fibre in it nothing could be done with it and it had to be thrown away. That showed the absolute necessity of attacking the stem the instant it was cut with a running stream of water to carry away the gum whilst it was in its natural state. It was then easily attacked but let it wait or dry in any way then the difficulty commenced and increased. The colour of the fibre was also darkened in proportion with the delay in removing the juice."

THE GUM OF RHEA FIBRE

When the experiments with **Mr Greig's** machine were concluded all the rollers &c were found to be thickly covered with a very hard varnish—so hard that it could only be taken off by a chipping chisel. It had the appearance of lac. The analysis of this dry juice has been published as follows: "The juice contains 62 per cent. by weight of oxalate of lime and besides this some alumina, oxide of iron and other mineral matters which dissolve in hydrochloric acid, the residue insoluble in dilute hydrochloric acid, consists of colouring and resinous matter and forms 2.5 per cent. by weight of the dry juice." (Foot note to *Dr Forbes Watson's Lecture before the Society of Arts* p. 13)

VALUE OF THE PREPARED FIBRE.

China grass fetches about £49 to £50 a ton in London. Indian rhea fibre a slightly lower figure. According to **Dr Forbes Watson** Messrs Death and Ellwood's 'Universal fibre extractor' could turn out the

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fibre at from £7 to £9 a ton calculated at 100 lbs of fibre for the working day per machine. Such being the case the result will be that China grass may be introduced at a much cheaper price than hitherto. What that price will be I cannot say but I think it will be possible to sell at £30 to £35 a ton possibly less' (*For Death and Ellwood's Machine see page 481*). Mr Oollier in the discussion which followed Dr Forbes Watson's lecture at the Society of Arts said that for rhea at £30 a ton there was no limit practically to the quantity which could be sold at £40 it would go slowly at £50 with the present price of wool it was barred. A manufacturer remarked— If you bring it down to £35 you will sell a lot if you bring it to £30 nobody knows the quantity we can use. Mr Haworth at the same meeting said that a larger quantity of rhea would one day be sold than of jute at the present day.

HISTORY OF THE RHEA INDUSTRY**HISTORY**
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In the *Ramayana* mention is made of the nettle-cloth and it is praised for its beauty and fineness. There is therefore some *prima facie* evidence that a nettle fibre has been known for several centuries in India. So early as in the reign of Queen Elizabeth in England Lobel the botanist relates that in Calcutta in the East Indies the people manufactured from the fibres of a species of nettle a very fine and delicate tissue. Later these fine cloths were imported into Europe but principally from Java to the Netherlands where this cloth was in great demand under the name of *neteldoek* a name indicating the origin of these cloths. The word *netel* means nettle and *doek* tissue. From that time attempts were made and with success to imitate with flax fibre the beautiful and fine tissue of the ramie of which after all it is but a weak counterfeit (*Theo Moerman*).

Dr Roxburgh without apparently being aware of the existence of rhea in Assam and parts of Bengal and of the fact that it was being cultivated and used by the natives there procured from Sumatra in 1803 four plants of the *Caloe* and planted them in the Botanical Gardens Calcutta. He gave the plant the name *Urtica tenacissima*. These imported plants grew and multiplied so rapidly that shortly after he had several thousands. About this time the discovery was made by Dr Buchanan Hamilton that the *konkura* of Rungpore and Dinagepore was identical with the plants Dr Roxburgh was cultivating. In 1810 Dr Buchanan sent to England three bales of fibre from the plants grown by Dr Roxburgh. The experiments made with this fibre showed that a cord spun from it sustained a weight of 252 lbs against 84 lbs required by Her Majesty's Dockyard to be borne by Russian hemp of the same size. In 1814 more bales of the fibre were sent by Dr Buchanan to the Court of Directors (England). In 1816 the Court sent out several of the machines then recently patented by Messrs Hill and Bundy to be used in the preparation of rhea. From this date however the interest in rhea fibre seems to have fallen off until 1840 when the discovery by Colonel Jenkins of the same plant growing wild in Assam again caused attention to be directed to it. A few specimens from Assam were sent to the Agri Horticultural Society of Calcutta and from cuttings thus obtained plants were grown in the Society's Garden. From this date the Society received contributions from several writers, from time to time, giving new facts regarding the growth and preparation of the fibre in Northern India. Dr McGowan furnished information and samples from China and Dr Falconer and afterwards Sir William Hooker identified Rhea as the same plant from which the Chinese grass-cloth is prepared (*Compare with remarks at pages 464 and 479*).

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HISTORY

In 1851 several specimens of rhea in various stages of preparation were forwarded to the London Exhibition they attracted considerable attention and were awarded no less than three prize medals The following year a consignment of the fibre from Assam was forwarded by the Government of India to the Court of Directors ; it was experimented with by **Dr Forbes Royle** the result being that its average strength as compared with Russian hemp, was declared to be in the ratio of 280 to 160

EFFORTS TO EXTEND RHEA CULTIVATION

In 1854 the Court of Directors asked the Government of India to furnish 10 tons of the raw fibre but owing to its limited cultivation only one third the quantity could be supplied **Sir Fredrick Halliday** then Lieutenant Governor of Bengal directed the purchase during the ensuing three years of a quantity of fibre up to 10 tons a year in order to encourage the cultivation These purchases were transmitted to London and sold The fibre had by this time become known in England and France and as it was thought that its further development might be safely left to private enterprise the experimental consignments were discontinued

The demand continued satisfactory though on a rather small scale but was supplied chiefly by China and only to a very light extent by India.

In 1872 however the fibre seems to have been making rapid progress China supplied through London between 200 to 300 tons valued at about £80 a ton In that year a sudden change occurred the demand fell off and the price came down to from £20 to £40 a ton for the China and from £19 to £30 a ton for the Indian fibre Rhea waste began to command a readier sale than the combed fibre for it was found by the manufacturers that in the waste state it was procurable at a smaller cost and therefore more profitable since in the end (owing to the want of proper extraction) both waste and combed fibre had to be treated with the same care trouble and expense (*Journ Soc Arts*)

In 1880 the Rajah of Dinagepore intended undertaking the cultivation of rhea in his estate He tried to purchase a supply of roots from the cultivators but as soon as the news of the project spread over the districts exorbitant prices were demanded The Rajah then procured 25 maunds of roots from Saharanpur 11 maunds from the Calcutta Botanic Garden and 11 maunds from the Bally Paper Mills With the two latter supplies 10 bighas were planted in May and June and it was the intention of the Rajah to plant a hundred acres of land with rhea. The results of these experiments have not as yet been made public

In 1881 Messrs Burrows Thomson and Mylne estate-holders in the Shahabad District (Bengal) intended among other things to induce their tenants to grow rhea and to prepare the fibre as a domestic industry They wrote We see no reason why its preparation by hand should not become as successful in India as it is in China Certain kinds of available and cheap labour are as plentiful in the former as in the latter country The *parda-nasheen* women and girls in vast numbers of poor high-caste families confined as they are by custom to their houses cannot assist the male members of the family in any out door work or contribute to the general earnings except to a very small extent by cotton spinning and the demand for this homespun yarn decreases as mills are adopted to produce it cheaper and better In 1882 it was ascertained that these gentlemen were growing the rhea plant and were trying several methods of preparing the fibre that they had sent to England some of the fibre, treated in a way likely to suit the manufacturers of England and France, and were awaiting the result before encouraging an extended cultivation of the plant. The final result has not as yet been made public.

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More recently rhea has in Europe acquired a position of considerably augmented importance as an industrial product. Large plantations have now been organised in Italy. Portugal has already planted a million roots and Spain has taken important steps in the matter. France seems to have given the lead in the movement and during 1882 several million root plants were imported. The plantations in Algiers and Egypt have also been materially increased. (*Journal of Society of Arts*)

PROPERTIES AND USES OF RHEA FIBRE

Rhea has been recognised as pre-eminent amongst fibres for strength fineness and lustre. Experiments made by **Dr Forbes Royle** as to strength showed that its average power as compared with Russian hemp was in the ratio of 280 to 160. Its fineness has been demonstrated by **Dr Forbes Watson** who showed that the mean diameter of the ultimate fibres of flax is about $\frac{1}{1000}$ of an inch of jute $\frac{1}{1500}$ of hemp $\frac{1}{1700}$ of rhea from Assam about $\frac{1}{1100}$ and of Chinese rhea $\frac{1}{1100}$ of an inch. The length of the fibre varies from 2.36 inch to 7.87 inch and even 9.84 inch the mean diameter is about 0.002 of an inch (*Spons Encycl*). Regarding silkiness jute is the only fibre known commercially which can compete with rhea but jute is far inferior to it in strength and durability. Rhea has besides a high resisting power when submitted to the influence of moisture and variations of atmospheric condition. This power may to some extent be tested by the action of high pressure steam on fibres. Experiments were carried out under the direction of **Dr Forbes Watson** with this object the fibres of rhea and of other plants were exposed for two hours to steam of about two atmospheres and then boiled in water for three hours and the loss in weight ascertained. They were then again exposed to the action of steam at the same pressure for four hours and the loss in weight again ascertained. The percentage loss of a specimen of Chinese rhea amounted only to 0.89 and of Assam rhea to 1.51 while flax lost 3.50 per cent Italian hemp 6.18 Russian hemp 8.44 and jute even 21.39 per cent. **Dr Forbes Watson** says: A very characteristic and in some respects unfavourable quality of the Rhea is the comparative stiffness and brittleness of the fibre and most of the difficulties which in spinning and manufacturing it have to be overcome are due to this circumstance. It is this stiffness which prevents rhea although so strong in its usual condition from sustaining as easily as other fibres the effect of a sharp bend or kink. Thus if a knot be tied with a small bundle of fibres the rhea will break very readily much more so than flax for instance although all fibres will break more readily under such conditions. Another consequence of this stiffness is that the fibre does not twist easily and the yarn spun from rhea is often very rough notwithstanding the smoothness and silkiness of the individual filaments. This roughness is due to the projecting ends of the ultimate fibres turned outside by the twist which the yarn receives in spinning. On the other hand the stiffness or hairiness has also certain advantages as in consequence of this rhea readily combines with wool. Thus rhea in virtue of its quality has a wide range of affinity with other fibres though it is not perfectly similar to any of them. This explains why its experimental applications cover such a wide field. It has been actually tried as a substitute for cotton hemp flax wool, and silk. In his more recent lecture before the Society of Arts upon this fibre **Dr Forbes Watson** says: 'Now what is rhea good for? It is difficult to say what it is *not* good for. It is the strongest fibre in nature.'

**MIXED
FABRICS
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RHEA WITH COTTON—The first trials in the use of rhea with cotton were made in 1862 in England and France. Rhea fibre from China was cut into length of two inches and treated with alkalis and oil giving a

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nivea.

material suitable for admixture with cotton. This cottonised rhea was the subject of various experiments. It was mixed with cotton, was spun and the yarn woven into different fabrics and dyed and printed without any difficulty. The fabrics so made gained in strength and acquired a certain amount of gloss. But considering the matter in a commercial point of view, it may be said that rhea will never pay as a mixture with cotton. It will always remain too valuable a material to be used as an admixture with or even as a substitute for cotton, the cost of extraction being prohibitive of such use. This was true some few years ago, but it seems probable that new machinery will lower the price of rhea until admixture with cotton will be possible. **Mr W Haworth**, speaking of the use of rhea with cotton, says: "Rhea would make the warps of the finest cotton goods and the wefts could be made of Sea Island or other fine cotton. It could be used for the finest materials up to the coarsest."

RHEA WITH FLAX—The probability of its being used with flax occurred to the early experimenters, but experience soon showed that it was necessary to overcome technical difficulties before rhea could be spun successfully on flax machinery. These were subsequently overcome and **Moerman** in his pamphlet on rhea mentions the fact that he examined specimens spun in some French and Belgian mills by flax machinery on cold water frames and that they were smooth and glossy, the gloss being secured by passing the fabric between cylinders. **Dr Forbes Watson** in his report (1875) wrote: "If as seems probable, rhea could be worked up on the same machinery as flax, the development of the rhea trade would be immensely facilitated inasmuch as there would then be an immediate and practically unlimited field for its consumption. In his lecture (1883) he says: 'Many years ago one of the largest flax spinners in the kingdom spent a considerable sum—£20,000 I believe—in trying to use China grass in the place of flax, but the experiment was given up owing to the hairy character of the yarns produced. It is however quite possible to prepare rhea in a way which would enable it to be spun on flax machines, and we find table cloths and beautiful fabrics of this material equal to anything that could be produced from flax.'

RHEA WITH WOOL—In combination with wool rhea seems to have a chance of success and its application in this manner attracted most attention and for a time achieved the greatest share of success, since it was less costly than wool and bore a striking similarity to it. The prepared rhea or China grass cut up into suitable lengths has in fact, says **Dr Forbes Watson**, been found capable of being spun on worsted machinery and then used like mohair or other long stapled wools for the manufacture of certain kinds of fabrics which depend for their effect on the gloss of the material. These fabrics were made as a rule with cotton warps, rhea yarn of comparatively little twist being used as weft. The use was mainly for ladies' dresses and at first it seemed as if the success was complete. But after a certain time the inferiority of the new fabrics for ladies' dresses became manifest. Although everything that could be desired as regarded appearance and finish, there was the fatal objection that in wear they became easily creased, as the vegetable rhea fibre is wanting in the great elasticity possessed by wool. In view of such an inferiority, the prices then ruling for rhea made its use for this purpose no longer remunerative. The new trade collapsed as rapidly as it had sprung up and since 1872 the matter is again one of experiment. The creasing, however, is to be got over by mixture with wool or by the use of very thick cotton warps and fabrics of a new kind have been manufactured on a small scale and have found a ready sale.

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Dr Forbes Watson's report is full of useful information and the following passage may also be quoted. There is sufficient evidence that at prices of the raw material permanently lowered —by more efficient and less costly modes of extraction and preparation of the fibre as well as by extended cultivation of the plant— there would be a larger field for the use of rhea as a substitute for long stapled wool. Even if its use for ladies' dresses were not again resumed there are hangings, carriage linings, carpets and other manufactures for which the suitability of rhea has been established and for which its application continues to engage the attention of some of our most eminent manufacturers. There are several circumstances favouring the use of rhea in this line rather than in competition with flax. The material competed with is higher priced than flax, the better classes of wool varying from £130 to £280 per ton, whilst those which in their raw state are lower priced contain such a proportion of dirt that the price for the really available fibre is here also in reality not much lower. There is also the circumstance that the rhea combing waste or noils has been found very suitable for mixture in bulk with rough kinds of wool and capable of being used for blankets, as also possibly for giving strength to shoddy and for a variety of other rough purposes."

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RHEA WITH SILK—As a mixture with silk rhea has a formidable rival in jute and although the subject of using rhea as a substitute for or admixture with silk has been repeatedly taken up in England and in Lyons and by the application of rhea it has been found possible to imitate to a certain extent the effects of silk in certain mixed fabrics, the special use of rhea for this object has never acquired any real footing. **Dr Forbes Watson** says however that rhea is prepared in various ways so as to leave the gloss upon it giving it all the appearance of silk and it is certainly far superior even for mixing with silk than jute.

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RHEA AND HEMP—In Assam and Bengal where the rhea grows the use to which it is commonly put is the same as that for which hemp in Europe is used —i.e. it is employed for nets, fishing lines and other purposes for which strength, lightness and power of resisting water are essential. Viewed as a material for such use rhea figures prominently in its chances of success. Hemp is it is true, lower priced than rhea, but it suffers a greater loss in weight in the process of heckling than rhea, while the latter is superior in strength and in resistance to water and lighter cordage of it would do the same work as heavier ones of hemp.

For many purposes, says **Dr Forbes Watson**, such as ships, rigging, the increase in lightness is in itself an important consideration apart from the saving of the material. On all these grounds rhea may be substituted with advantage for hemp even if it be at a considerably higher price than hemp. The same may be said of its cognate use for canvas and sail cloth instead of flax. In that case also the superior strength of rhea results in the double advantage of a saving in material and of greater lightness, and would enable it to compete successfully with flax even if this latter were considerably cheaper per ton.

RHEA AS A ROPE AND CORD FIBRE—The great strength of the fibre, its lightness and power of endurance under water are qualities which place it in the first rank of fibres suitable for ropes and cables.

LOCAL APPLICATIONS OF THE FIBRE—In Upper Assam the *dooms* or fishermen cultivate the rhea plant and extract the fibre by manual labour employing it in the construction of their fishing nets.

In the Rungpore and Dinagapore districts a limited amount of rhea is regularly cultivated in some localities especially along the banks of the

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Cords

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Nets

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nivea.

Attri and Teesta rivers where fishermen reside. The cultivators find a ready and remunerative sale for the fibre but they have seldom over a few square yards under plant and although it is cultivated all over these districts the cultivation is only practised on a small scale. In Bhagulpore people of the *dhanook* caste are said to prepare rhea fibre and to sell it to the silk and tusser weavers in the district the inference to be drawn being that the weavers mix rhea with silk.

AS A PAPER MATERIAL, Rhea is of course not likely to be of much use owing to its value and high price. But some of the waste can undoubtedly be used for this purpose chiefly as an admixture to impart strength and cohesion to very inferior materials.

When dried the leaves are very fibrous and may be used as a paper material. **Theo Moerman** in his little book on *The Ramie* mentions that about 6750 lbs of dried leaves may be obtained from an acre.

MINOR USES OF RHEA FIBRE.— Amongst the minor uses of rhea may be mentioned the fact that it is sometimes used for packings of steam engines. As a curiosity it deserves to be mentioned that rhea fibre is now in use for polishing vory such as billiard balls, &c. Experiments have recently been made to turn rhea fibre into a material closely resembling leather to be used as a substitute for leather bands.

METHODS OF TREATING AND SEPARATING THE FIBRE
MANUAL LABOUR

The real difficulty in the way of an extended utilisation of the rhea fibre is the decortication of the stems or in other words the extraction of the fibres at a reasonable rate and in a condition fit for commerce. **Dr Forbes Watson** in a lecture before the Society of Arts explained the constituents of the rhea stem. He said: "You will observe on breaking this sample of green rhea I succeed in getting off a certain quantity of green fibre tearing it down in this manner. I wish to refer in the first place to the composition of the component parts of this bark. The outside portion consists of a film to which a very distinguished chemist has applied the term *cutose*. Below that there is a bark which contains the green colouring matter of the plant that is called *vasculose* and next to that comes the fibre itself. That fibre and the bark attached to it is united to the stem by another principle which is called *pectose*. The difficulty consists in getting the bark and the other matters separated from the fibre. To accomplish this various contrivances and machinery have been specially introduced and patented."

In China, Borneo and Sumatra the following system is adopted.

The stalks are cut and collected in bundles and are then thrown into still pools and kept there for several days until the process of retting so as to cause the bark to separate easily from the wooden parts is sufficiently advanced. At this stage the bundles of stalks are removed from the water and all the cortical bark or raw fibre is immediately collected. To do this the bark on the stalks is split in the centre two fingers are inserted between the wood and the bark and slipped along the whole length of the stalk between the wood and the bark which brings out the fibre in two strips or ribbons. These strips are spread out on fields to complete and finish off the process of retting by exposure to the dew but those who are more skilful collect these strips of bark into bundles, and again for a second time throw them into water to effect a cleansing by a fresh and more complete process of retting. By this second steeping another fermentation and decomposition is brought about of the sap or pith incrusting in the fibres. This process completes more thoroughly the retting which is not effected by the simple exposure to the dew.

Used in India
as a silk
substitute

599

Waste.
600

Steam-
packings
601

Polishing
Ivory
602

Leather
substitute.
603

604

**BEHMERIA
nivea.****Rhea Fibre****MACHINERY**

After this second retting it only remains to work up and comb out the fibre and thus prepare it to be spun to any quality of fineness (*Theo Moerman*)

In Java the natives do not, apparently resort to retting in pools. The same author explains the mode adopted thus. After dividing the stalks into halves lengthwise they remove the bark from which they then separate the epidermis and the adhesive portions by scraping it with a knife until the fibre begins to appear. This is white with a slight shade of green. They content themselves with washing this fibre several times in water and then dry it but this manipulation as will be easily understood is not sufficient to entirely get rid of the glutinous matter which adheres to the fibres. In Borneo and Sumatra the following mode is in practice. The stalks are collected in bundles and are exposed for four or five days to the action of water. This destroys the thin bark and much of the gummy matter and partially separates the fibre which is then taken out, dried and exposed to the dew for several days.

In Upper Assam the following method is practised. The operator holds the stalk in both hands nearly in the middle and pressing the forefinger and thumb of both hands firmly gives it a peculiar twist and breaks through the inner pith. Then passing the fingers of his right and left hand rapidly, alternately towards each end the bark with fibre is completely separated from the stalk in two strands. The strands of bark and fibre are now made up into bundles of convenient size tied at the smaller end with a shred of fibre and put into clean water for a few hours which I think causes the tannin or colouring matter to wash out. The cleaning process is as follows: the bundles by means of the tie at the smaller end are put on a hook fastened in a post at a convenient height for the operator who takes each strand separately by the larger end in his left hand passes the thumb of his right hand quickly along the inner side by which operation the outer bark is completely separated from the fibre and the riband of fibre is then thoroughly cleaned by two or three scrapings with a small knife. This completes the operation with some loss however say one fifth and if quickly dried in the sun it might at once be made up for exportation but the appearance of the fibre is much improved by exposure (immediately after cleaning) on the grass to a night's heavy dew in September or October or a shower of rain during the rainy season. After drying the colour improves and there is no risk from mildew on the voyage homewards (*Major Hannay in the Fibrous Plants of India by J. Forbes Royle 1855 p 363*)

MACHINERY USED IN SEPARATION OF THE FIBRE**RHEA
MACHINERY
605**

The rhea fibre (or China grass) having been made known in Europe at the beginning of the present century the attention of experts seems immediately to have been turned to the question of improvements in the extraction and preparation of the fibre. The first patent was taken out by a **Mr James Lee** for separating the fibre by mechanical means and without the aid of water retting. No tangible results however seem to have been obtained so far as can be ascertained from the employment of this machinery. Meanwhile attention continued to be devoted to the question and among other inventions may be cited the chemical process of Messrs L. W. Wright & Co for which these gentlemen obtained a patent in 1849. Their process consists essentially in a very ingenious arrangement for boiling the stems in an alkaline solution after they have previously been steeped for 24 hours in water of a temperature of 90°. The fibre is then thoroughly washed with pure water and finally subjected to the action of a current of high-pressure steam till nearly dry. At the London International Exhibition of 1851

Rhea Fibre.

BOEHMERIA
nivea.

MACHINERY

these gentlemen exhibited samples of rhea prepared by their process and received a silver medal. To other exhibitors were also awarded prizes, but still the question of the preparation of the fibre remained unsolved.

In 1869 the Government of India turned its attention to the utilisation of the rhea fibre and issued a Resolution in which it expressed the conviction that the value of the rhea fibre was undoubted, that all the conditions necessary for its cultivation on a large scale were present in India and that the only obstacle to the development of an extensive trade in this product was want of suitable machinery for the separation of the fibre from the stems and bark of the plant in its green or freshly-cut state. To encourage the invention of such machinery an announcement was made by the Government of India in June 1870 that a public competition would be held and a prize of £5,000 would be given for the best machinery. No fewer than 32 competitors entered their names but at the last moment only one of them, Mr Greig of Edinburgh, appeared in India. The trial took place in August 1872 at Saharanpur where a plantation of rhea had been established for the purpose. It was found that the cost of preparing the clean fibre by this machinery amounted to more than £15 a ton and at the same time the fibre was pronounced defective in quality and was valued at £28 a ton only in England and declared suitable for cordage only. Under these circumstances the full amount of the prize was not awarded but in consideration of the fact that the machine was a *bona fide* and meritorious attempt to meet the requirements of the case a donation of £1,500 was given to the inventor.

The following year (1873) fresh trials were arranged to take place in England under the superintendence of Dr Forbes Watson with a supply of rhea stems from the south of France. A notification was issued by the India Office and 200 applicants responded. The trial did not however prove a success as the supply of plants was less and of poorer quality than had been expected. In the latter end of the same year a fresh offer of plants was made by Dr Forbes Watson to those who wished to continue their experiments and upwards of 100 asked for fresh supplies. These were procured from the district of Vaucluse (France) and made over to the applicants. The results have not been made public.

Meanwhile the demand for rhea fibre in Europe seemed to continue. Having reconsidered the matter the Government of India in a Resolution dated August 1877 renewed the offer of rewards. The terms now offered were that a reward of £50,000 would be given to the inventor of the best machine or process which would separate the bark and fibre from the stem and the fibre from the bark of the *Boehmeria nivea*, and a further reward of £10,000 to the inventor of the next best machine or process provided it was adjudged to possess merit and to be capable of adaptation to practical uses. The machine or process required was to be capable of producing by animal water or steam power a ton of dressed fibre of a quality which shall average in value not less than £45 per ton in the English market at a total cost including all processes of preparation and all needful allowance for wear and tear and not more than £15 per ton laid down at any port of shipment in India and £30 in England after payment of all the charges usual in trade before goods reach the hands of the manufacturer. The machinery was to be simple, strong, durable and inexpensive and suited for erection in plantations where rhea was grown. The competition was to take place at Saharanpur the Government agreeing to provide accommodation for the competing machines, as well as affording the motive power required. The Government was also to pay for the transport of all machines from the sea-coast to Saharanpur up to a limit of one ton for each machine.

**BOEHMERIA
nivea.****Rhea Fibra.****MACHINERY**

and to allow a free second class ticket by rail to that station to any person in charge of a machine

The trials were fixed to commence on the 15th September 1879 and a Committee of Judges was appointed to conduct them. Twenty four applications for permission to compete were received but only ten competitors ultimately arrived at Saharanpur and of these three with drew from the competition. The trials were held in September and October 1879.

The fibre turned out by each of the competing machines was carefully packed and despatched to the Secretary of State with a view to its being tested and reported on by experts in the trade in England. The reports received from the Secretary of State (August 1880) stated that the samples were far inferior to the fibre imported into England from China the value of which at that period was £50 a ton. As no competitor had produced a fibre of a value even approaching the amount fixed in the Resolution of August 1877 the Committee did not recommend the grant of either of the prizes to any of the competitors. They were however of opinion that some of the machines possessed sufficient merit to warrant the grant of a reward to the owners and the gentlemen mentioned by them as deserving of remuneration were Messrs Nagoua Vander Ploeg and Cameron. The fibre turned out by Mr Vander Ploeg was valued less highly than that produced by Messrs Nagoua and Cameron but the Committee attributed this to the fact that he aimed at producing the fibre in a finished state fit for the spinner (a condition in which it was understood that the English dealer did not require it) and not to the inability of his machines to yield as good fibre as those of Messrs Nagoua and Cameron. The Committee remarked also that there was little novelty in Mr Cameron's process and that it was only an improvement on a method by which fibre was actually extracted from various plants by the natives of India. The same method was also applied in many of the Indian jails for the extraction of aloe fibre. The process was simple enough and might be employed by the natives without special instruction and any kind of stem green or dry short or long could be treated by it but it would be difficult of application in a rhea plantation where the stems of many acres of land would have to be worked off quickly. Having regard to these circumstances the Committee recommended that a grant of Rs 5000 each be made to Messrs Nagoua and Vander Ploeg and another of Rs 1000 to Mr Cameron.

The Government of India reviewed the above facts in a Resolution dated March 1881 and decided in concurrence with the Committee that as none of the fibre produced came up to the conditions prescribed the prizes offered in 1877 could not be awarded. At the same time the Government of India agreed in the Committee's opinion that some recognition of their efforts was due to the three gentlemen whose machines yielded the best results or appeared to possess superior merit, and sanctioned the grant to them of the sums recommended by the Committee. The Government of India further stated that. From the low valuation put by the English firms on the samples of fibre produced at the late competition it does not seem probable that Indian rhea fibre will be able for the present at least to compete successfully with the Chinese product while the experience which has been so far gained also points to the conclusion that in most parts of India the cultivation of rhea cannot be undertaken with profit. Rhea is naturally an equatorial plant and it requires a moist air, a rich soil and plenty of water while extremes of temperature are unfavourable to it. Such conditions may be found in parts of Burma in Upper Assam, and in some districts of Eastern and Northern Bengal.

Rhea Fibre.

BCEHMERIA
nivea.

MACHINERY

and if rhea can be grown in such places with only so much care as is required in an ordinary well farmed field for a rather superior crop it is possible that it may succeed commercially. Until however, private enterprise has shown that the cultivation of the plant can be undertaken with profit in these or other parts of the country and that real need has arisen for an improved method of preparing the fibre in order to stimulate its production the Government of India thinks it inadvisable to renew the offer, which it has now made for the second time without result, of rewards for suitable machines. But in order to aid persons who are anxious to try the cultivation of the plant in localities which are *prima facie* suitable the Government will be willing to place roots at their disposal. A plot of about two or three acres will therefore continue to be kept under rhea in the Botanical Gardens at Howrah for the supply of roots to intending growers.

A sample of China grass valued at £50 a ton in the English market was deposited in the Economic Museum at Calcutta and in accordance with the recommendation of the Committee specimens of the fibre produced by the several competitors at the trials at Saharanpur with the valuations of the experts noted on them were also deposited in the Museum for inspection by the public. It seems remarkable that so many fruitless attempts should have been made in India and scarcely any effort put forth to ascertain why it was that the China grass-cloth was uniformly superior to the Indian article. This would have settled the question as to whether rhea is in reality the same thing as China grass cloth. If rhea and grass-cloth were found to be actually produced from the same plant this enquiry would naturally have brought to light a more accurate account of the Chinese mode of separation of the fibre than we as yet possess. It is remarkable however that Chinese grass-cloth should be much finer than rhea that on being boiled it should lose only 89, while rhea under the same treatment parts with 151 of its weight. These and other facts in addition to the pronounced superior quality and therefore higher price paid for China grass cloth as compared with rhea, would seem to confirm the suspicion that these two fibres may after all be obtained from different plants.

This remark is made purely as a suggestion but it seems highly desirable that we should not only thoroughly examine all the plants met with in India which afford rhea like fibres as well as re-examine the plant from which the Chinese grass-cloth is obtained before much more money is spent on experiments with new machinery.

The withdrawal of the stimulus afforded by the Government prizes did not however damp inventive ardour and among other new machines may be noted those of Messieurs Fairer and Frémy and of Mr H. C. Smith commonly known as Messrs Death and Ellwood's Universal Fibre Extractor.

Messieurs Fairer and Frémy's invention consists in subjecting the plant to the action of steam for a period varying from 10 to 25 minutes, according to the length of time the plant has been cut. After steaming the fibre and its adjuncts are easily stripped from the wood. It then appears in strips or ribands containing the objectionable gum and outer bark. To remove these the strips are subjected to a chemical process in baths. This dissolves out the cutose vacuole and pectose and releases the fibre in its clean silky white condition ready for the spinner.

Messrs Death and Ellwood give the following specification of their machine. "The universal fibre-cleaning machine, invented by Mr H. C. Smith, manufactured and improved by Messrs Death and Ellwood of Leicester and brought to public notice by the General Fibre Company of London, is a very simple compact, and well-designed machine. It

**BEHMERIA
nivea.****Rhea Fibre****MACHINERY**

consists of a cast iron drum perfectly balanced on which eight gun metal beaters are bolted. The drum revolves in front of a table or feed plate fixed below the centre of the drum so as to give a scraping action when the beaters pass it. The feed plate is adjustable to and from the beaters by set screws so that a fine or thick fibre can be cleaned. Immediately below the feed table is a jet pipe which throws a strong, thin flat sheet of water against the whole width of the drum. These are the essential parts of the machine and they are mounted on a cast iron frame which carries them as well as a trough to receive and let out water refuse and waste and to prevent the water being thrown about. Two men feed the machine each taking from three to five leaves or stems at a time places the thick ends upon the feed table and pushes them against the revolving drum provided with beaters. These smash the woody parts of stems disengage the pulpy matters of leaves loosen all refuse matter and by their action draw the crushed stems or leaves under the drum here the sheet of water presses the stems or leaves against the beaters a beating and scraping action continues and the sheet of water acting as a cleanser as well as an elastic cushion or backing to the fibre while it is struck by the beaters ensures a thorough cleaning. The stems or leaves are allowed to pass half way into the machine and when with drawn all extractive matter has gone and clean fibre is obtained. This is held in the hands of the operators who then pass and withdraw the thin ends in the same way. The result is clean pure fibre which is then hung up to dry and when dry is ready to be baled at once. The cost of a single machine is £55 that of a double one complete is £100. A semi-portable engine to work two of the machines is supplied by the General Fibre Company of London for £82 10. On comparatively small plantations instead of the steam engine bullock gear can be used which for a single machine is supplied at £30 by the Company. (*Extracted from Hanlon and Liotard's report to Government of Bengal*) **Dr Forbes Watson** gives in his lecture on rhea delivered before the Society of Arts (London 1883) an interesting history of the circumstances which suggested to Mr Smith's mind the idea of the Universal Fibre Extractor.

What first suggested it to his mind was noticing the great aloes the stems of which grow up to 30 or 40 feet. Mr Smith observed during the monsoon in Mauritius that where the inner leaves were dashed against these great stems they were broken up the result being that the filth got washed away and the fibres were left hanging. This suggested to his mind the idea of a machine in which a rush of water would play the same part.

Some few months ago a series of experiments were performed under the joint direction of the Government of India and Government of Bengal with fibre extracting machines suitable for all fibres. Some nine exhibitors came forward but the committee awarded the prize of £2 000 to Messrs Death and Ellwood. The committee consisted of Messrs J W Hanlon and L Liotard assisted by the Agri Horticultural Society of India. In concluding their report upon The Universal Fibre-cleaning machine the members of the committee in recommending the prize to be awarded to Messrs Death and Ellwood say: "We are satisfied that as an extractor of fibres Messrs Death and Ellwood's machine is a distinct advance in mechanism of this class that it extracts fibres in their natural colour and in good merchantable condition that it operates on all plants with the same facility and that it is suited to the requirements of this country and is likely to prove of great service to its fibre industry." **Dr Forbes Watson** speaking of this machine in his lecture before the Society of Arts 1883, says: "It is provided with what are called beaters—that is to say a certain number of projecting ribs—and it revolves in front of a feeding table at a great rate being worked at 600 revolutions a minute."

Non Stinging Nettles

**BOEHMERIA
platyphylla.**

This operation goes on in front of the feeding table as it is called and this constitutes the whole machine as regards the mechanical portion with the exception of the water. Below and at an angle of about 45° a strong flattened jet of water passes and I will tell you what the effect of that is. The cylinder remember is rapidly revolving you feed in at the side here the beaters catch and break up the stalks into very small pieces and the jet of water coming from below meets the fibre and keeps it up against the beaters so that it is really beaten in a stream of water. The result of this is you not only get the fibre cleared of a large portion of its gum but you have next to no waste and what little there is is excellent for many purposes—it can be made use of as most other waste products can. This explains the secret of the success of the invention and how it solves the problem of a machine for cleaning rhea.

Food—When green the leaves are very much liked by cattle and are nutritious. When salted they will curdle milk like rennet (*Lindley's Vegetable Kingdom*).

**FOOD
Leaves
606**

I am indebted to Mr L. Liotard of the Revenue and Agricultural Department for much assistance in collecting many of the extracts compiled in the preceding pages regarding rhea fibre.

Boehmeria platyphylla, Don Brandis For Fl 403

Syn—*B. MACROSTACHYA* Wedd. *URTICA MACROSTACHYA* Wall.

Vern—*Gargela* (KUMAON) HIND. *Kamli* NEPAL.

Habitat—A large shrub or small tree met with in the outer Himalayas up to 7000 feet in the Khasia Hills East Bengal South India and Ceylon.

Botanic Diagnosis—Branches 4 sided. Leaves opposite broad ovate petiole $\frac{1}{2}$ the length of the leaf or longer. Styles hairy exserted (rarely shorter than the female perianth tube). One of the commonest and most variable species in the genus.

Structure of the Wood—Moderately hard reddish brown with occasional concentric bands of darker and lighter colour.

The following may be enumerated as the principal Indian varieties—

**FIBRE
607
Timber
608**

a, Hamiltoniana, as in DC Prod XVI I 213

Syn—*B. HAMILTONIANA* Wedd. in *Ann. Sec. Nat. Kurs Fl. Burm.* II p. 424. *URTICA HAMILTONIANA* Wall.

Vern—*Tuksur* LEPCHA. *Sapsha* BURM. (*Kurs*).

Habitat—An evergreen small tree often 20 feet in height met with in the lower tropical Himalayas from Sikkim and Bhutan eastward to Burma. Plentiful in the tropical forests especially along chougongs of the eastern slopes of the Pegu Yomah and Martaban east of Tounghoo (*Kurs*).

Botanic Diagnosis—Leaves opposite long acuminate minutely toothed 4-6 in long 3 nerved with a gland at the basilar nerve axil. Styles shorter than the perianth. *Kurz* regards this as distinct but the only character in favour of this view is apparently the short style.

Fibre—Strong cordage can be obtained from the liber (*Kurs*).

**FIBRE
609**

β, macrostachya, Wedd in DC Prod XVI I 211

Syn—*SPLITGERBERA MACROSTACHYA* Wight, *l.c.* t. 1977. *BOEHMERIA MAURITIANA* Wedd. *B. WIGHTIANA* Wedd. *URTICA CAUDATA* Poir.

Habitat—A large bush met with on the Nilgiri Hills and Ceylon with long petiolate leaves and female spikes generally undivided.

**FIBRE
610**

BOEHMERIA
travancorica.**Non-stinging Nettles.**

- γ, rotundifolia, Wedd in DC Prod XVI I., 212**
Syn.—*B. ROTUNDIFOLIA Ham et Don Prod Nepal p 60*
Vern.—
Habitat.—A small bush met with in the Konkan in Nepal the Khásia Hills and Ceylon ascending to 1500 feet in altitude with rotundate abruptly acuminate leaves
- FIBRE 611**
- δ, scabrella, Wedd in DC Prod XVI I 211**
Syn.—*URTICA SCABRELLA Roxb Fl Ind Ed CBC 685 Wight Ic t 691 U CAUDATA Nic B OURANTHA Miq B SCABRELLA Gaudich*
Habitat.—A shrubby spreading form met with in Nepal Assam Khásia Hills, Chittagong the Nilgiri hills Ceylon and Java with small cordate serrate rough leaves and flower spikes erect as long as the leaf or shorter male ones crowded short and in the lower axils female ones above and generally solitary
 Apparently not put to any economic use although all the species of this genus are known to yield good fibres Flowers at the end of the rains and the seeds ripen during the cold season (*Roxb*)
- FIBRE 612**
- ε, Zeylanica, Wedd**
 Common in the Central Provinces and Ceylon up to an elevation of 6000 feet
- 614 Boehmeria polystachya, Wedd**
Syn.—*URTICA POLYSTACHYA Wall*
Habitat.—A Nepal species apparently not put to any economic purpose It is also met with in East Kumaun
- 615 B rugulosa, Wedd Brandis For Fl, 403**
Syn.—*URTICA RUGULOSA and U VENOSA Wall B NERVOSA Madden*
Vern.—*Geti gaints HIND Dar NEPAL Sedeng LEPCHA*
Habitat.—A small tree with greyish brown branches met with in Garhwál Kumaon Nepal Sikkim and Bhután
Botanic Diagnosis.—Branches terete when young as also the petioles and under sides of the leaves hoary Leaves alternate elliptic lanceolate 3.5 in long obtusely dentate with 3 longitudinal nerves from the base to the apex, each penniveined the lateral branching veins on the inside anastomosing with each other those on the outside with an intramarginal vein petiole many times shorter than the leaf Flowers dioecious in round sessile clusters each cluster in the axil of a cordate membranous bract Brandis says the leaves very much resemble those of *Sarcochlamys pulcherrima*, but that it is readily distinguished by the long simple flower spikes
- TIMBER 616**
Structure of the Wood.—Red moderately hard even grained durable seasons well A nice wood easy to cut and work Weight 41 lbs per cubic foot
 It is used in Kumaon and Nepal for making bowls in Sikkim for milk pails churns and other dairy utensils The Lepchas make cups bowls, and tobacco-boxes of it
- B salicifolia, Don, syn for Debregeasia bicolor, which see**
- 617 B travancorica, Bedd**
Habitat.—A small tree of the Wynad, South Kanara Ghâts and the Travancore hills up to 4,500 feet.
- B 617**

The Hog-weed.

BOERHAAVIA
diffusa.

BOERHAAVIA, Linn Gen Pl III, 5

A genus of spreading herbaceous plants belonging to the NYCTAGINÆ, comprising some 30 species, widely dispersed throughout the warm regions of the globe

Annual or perennial plants woody below glabrously glandular or pubescent branches few spreading Leaves opposite subsessile or petiolate equal or unequal entire or sinuate fleshy Flowers few and small in umbellate c^o capitulate panicles sessile or pedunculate flowers articulated to the peduncle bracts often deciduous the young fruit frequently covered with glandular hairs Perianth tube short or long base ovoid contracted above the fruit limb infundibuliform margin 5 lobed lobes distinct plate deciduous Stamens 15 exserted filaments thin unequal free above connate below anthers didymous Ovary stipitate oblique style erect attenuated into the peltate stigma Fruit (when young) obovoid 5-costate or 5-angled glandular ripe fruit oblong 1-celled 1 seeded embryo usually conduplicate

618

Boerhaavia diffusa, Linn ; Wight Ic t 874 NYCTAGINÆ

619

THE SPREADING HOG WEED

Syn — B PROCUMBENS Roxb Fl Ind Ed CBC 49 B ERRECTA Gartn Roxb Fl Ind DC Prod XIII 1 452

Vern — Sant HIND Gadha purna punarnab seveta punarnaba BENG ; Punarnav visha kharpara sothaghm (?) sindika SANS Yan tōps SINGH ; Punarnava khāparā ghetull BOMB Vakha khaparo dholi sāturdī mota satodo GUJ Punarnuwa (atodiputchee) CUICH ; Vasu MAR Thikri ka jhār DUK Nakbel SIND Mukaratte kire mukuk rattai TAM Atika mamidi TEL

Habitat — A troublesome weed found all over India

Botanic Diagnosis — There are two well marked varieties of this plant one with white and the other with red flowers In Bengali the former is called *shwet purna* and the latter *gudha purna* This is perhaps one of the most abundant and troublesome of weeds changing its appearance completely according as it is found growing on the top of a ruined wall or on an exposed situation in poor soil or under shade and in good soil All the forms are doubtless referable to one species Some are short erect branched others tall straggling or even climbers

Properties and Uses—

Food — The Rev A Campbell Santal Missionary Gobindpur has furnished me with a most interesting series of specimens of this plant The small bushy form found in the wild state is used it appears by the Santals as a medicine but the plants which spring up in their vegetable gardens are cultivated as pot herbs They do not sow or propagate the plant it exists in a state of semi cultivation only but at the same time it greatly improves becoming a climber and producing large succulent leaves I have received specimens from Mr Campbell quite six feet in length the whole plant so completely altered that but for the flower and fruit it is recognised with difficulty In this half cultivated condition it occurs in every Santal village and constitutes a considerable article of food The cultivation of this plant as a pot herb is a fact which does not seem to have attracted much attention ; it is alluded to in a few words by Balfour and is included in his list of green vegetables used in the Madras Presidency We have here what may be viewed as the first approach to the cultivation of a herbaceous wild plant as an article of food From its succulent nature it seems highly probable that under careful management, considerable improvement might be effected With the present outcry for new fodder plants before us it is worth suggesting that there would seem to be some hope of finding in this hardy indigenous plant a useful addition to our list of fodder plants Indeed the cultivation of an indigenous plant, such as this, seems much more hopeful than fruitless attempts to

FOOD
620Pot-herbs.
621

B. 621

**BOMBAX
insigne.****The Bombax.**Fodder
622MEDICINE
Root
623
Plant
624
Leaves
625Oil
626

627

628

629

introduce delicate exotics which at most are capable of being cultivated only in special or peculiar and therefore limited tracts of country or during certain seasons of the year *Borhaavia* is a perennial which in its wild state luxuriates on the poorest waste lands With the slightest effort a field of it might be raised which would continue to yield green fodder throughout the year and it therefore seems worth ascertaining whether cattle would thrive on such a crop Lanan in his *Hortus Famaricensis* says that in Jamaica the leaves are given to hogs hence the English name Hog weed It is given to cattle in Bengal as a medicinal food and is supposed to increase the quantity of milk (Babu T N Mukerji) (See *Ainslie Balfour Drury &c*)

Medicine—THE ROOT used in infusion or given in powder acts as a laxative diuretic anthelmintic and cooling medicine It has been found to be a very good expectorant and has been prescribed in several cases of asthma with marked success Taken in large doses it acts as an emetic (*Ainslie O'Shaughnessy 512 Pharm of Ind &c*) The root is said to be a strong emetic (*Bomb Gas IV 14*) In Goa the herb is esteemed as a diuretic in gonorrhœa In Bombay THE PLANT is much used as an external application to dropsical swellings A poultice of THE LEAVES is reported to be useful in abscesses (*Dymock Mat Med W Ind 540*) One of its Sanskrit synonyms—*sothagni*—means cure for dropsy Adecoction of *punarnava* root is recommended to be given with the addition of powdered *chireta* and ginger in anasarca AN OIL prepared with a decoction of the root and a number of the usual aromatics in the form of a paste is rubbed on the body in general anasarca complicated with jaundice It is called *Punarnava taila* (*U C Dutt Mat Med Hindus 222*) The Peruvians give an infusion of the *Borhaavia scandens* in cases of gonorrhœa (*Ainslie II 205*)

Special Opinions—§ The root of this is much used here in the cure of bronchitic asthma smoking is not allowed (*Surgeon Major P N Mukerji Cuttack Orissa*) Expectorant antispasmodic and tonic dose of the infusion 1 to 2 oz (*Surgeon W Barren Bhuj Cutch*) An infusion of the dry herb with nitrate of potash has been found by me to be very efficacious in dropsical affections In slight cases a dish of the fresh herb boiled and salted and eaten with bread (*chappaties*) without any other treatment seems to do good (*Asst Surgeon Nobin Chunder Dutt Durbhunga*) The white variety is preferred to the red The root is a good medicine for dropsy and asthma (*Surgeon Major Bankabehary Gupta Pooree*) The root bruised in water is a common application to the feet in cases of general debility (*Sakharam Arjun Ravat L M Girgaum Bombay*) Assistant Surgeon Moti Lal Mookerji extols this plant as a diuretic especially in dropsy (*Surgeon Major A Sanders Chittagong*)

BOMBAX, Linn Gen Pl, I 210

A genus of trees belonging to the MALVACEÆ and comprising some 10 species—2 natives of tropical Asia, 1 of tropical Africa and the remainder of tropical America

Leaves digitate deciduous *Peduncles* axillary or subterminal solitary or clustered 1 flowered *Flowers* appearing before the leaves *Bracts* none *Calyx* leathery cup-shaped truncate or 5 7 lobed *Petals* obovate *Stamens* pentadelphous bundles opposite the petals and divided above into numerous filaments; anthers reniform 1-celled *Ovary* 5-celled style clavate stigmas 5 ovule many in each cell *capsule* loculicidally 5 valved valves leathery woolly within *Seeds* woolly testa thin, albumen scanty cotyledons contort-triplicate.

Bombax insigne, Will Fl Br Ind I 349

Vern —*Semul-tula*, BENG *Saitu MAGH*

B 629

The Silk Cotton-Tree

**BOMBAX
malabaricum**

Habitat.—A large tree trunk without prickles met with in Chittagong Burma, and the Andaman Islands

Botanic Diagnosis—Trunk without prickles leaflets 7-9 obovate cuspidate-acuminate glaucous beneath, filaments slender $\frac{1}{2}$ the length of the petals

Properties and Uses—

Gum.—It yields a brown gum

Structure of the Wood—Similar to that of **B malabaricum** but pores smaller and more scanty The wood is also more durable than that of **B malabaricum** The specimen from the Andamans had been 12 years in Calcutta in the rough and was only slightly discoloured on being cut up (Gamble)

Bombax malabaricum, DC Fl Br Ind I 349 Wight Ic t 29

SILK COTTON TREE

Syn—**B HEPTAPHYLLA Cav Roxb Fl Ind Ed C B C 574 SALAMALIA MALABARICA Schott GOSAMPINUS RUBRA Ham**

Vern—*Semul or semal shembal semur pagun somr ragat senbal ragat smal kanti senbal* HIND *Rokto-simul simil* BENG *Simbal* HAZARA *Shirlan, SUTLEJ Dli KOL Edel* SANTAL *Simur MAL (S P)* *Bouro* SIMURI *URIYA Bouchu panchu* GARO *Sunglu* LEPCHA *Semar or semur C P Saur saer somr semul shembal* BOMB *Savara simlo samar kante savar kanteri samar shevari tamari savari* MAR *Rato-shemalo shemolo shimlo shimul shimar* GUJ *Kanton ku-khatyan kanton kd semul l kkatyon* DUK *Mundla buraga chettu* TEL *Pula mul ilava maram mulilavu* TAM *Pula maram mul lilava mullila-pula, MAI Mullu buragamuru burla, KAN Wallaski GOND Katscori BHIL Lapasing MAGH ; Salmali mocha, SANS Kattu imbul SINGH Letpan didu lepan bin* BURM

Habitat—A very large deciduous tree with branches in whorls spreading horizontally and the stem with large thorny buttresses Met with throughout the hotter forests of India and Burma It is abundant on the eastern side of India, ascending the mountains to 4 000 feet in altitude Distributed to Java and Sumatra It is the largest and most characteristic tree of eastern Ráputana (*Ráputana Gas p 25*)

Botanic Diagnosis—Trunk and branches covered with large corky prickles leaflets 5 7 quite entire cuspidate base tapering filaments ligulate half the length of the petals capsule oblong obtuse

Properties and Uses—

Gum.—*Mocharas* (i.e. the juice—*ras* of the *mocha*) *mochras mocherus mucherus*, and various other forms of the word are names given to a brown astringent gum like substance frequently seen in Indian bazars It occurs in the form of light or dark brown tears which are often hollow much resembling galls It is sometimes called *supari ka phul* (i.e. flowers of the *supari* or betel nut palm) It is difficult to account for this latter name the word *phul* is certainly used very frequently with a wide meaning so much so that it would be quite easy to understand its being applied to the large gall like tears of this gum It is much more difficult to account for the supposition that they were the *phul* (flowers) of the *supari* unless we imagine that as with *Catechu* at the present day this astringent gum was formerly eaten in *pán* along with the betel nut It seems quite satisfactorily proved that **Dr Birdwood** was mistaken when he stated that he believed the *mócharas* was “a kind of gall produced on the *Areca Catechu* (*Bombay Prod 10*)” **Dr Birdwood** affirms that he has himself gathered precisely identical excrescences from *Areca Catechu*.” (*Dr Cooke's Report on Gums 1874 p 40*) It is a remarkable fact that no one has as yet confirmed **Dr Birdwood's** observation regarding these gall like excrescences occurring upon *Areca Catechu*,

GUM
630
TIMBER
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GUM
Mocharas
633

B 633

**BOMBAX
malabaricum.****Mócharas Gum.**

but while this is so, his statement regarding them has passed into the literature of the subject (See *Baden Powell Pb Prod I 319 397 Cooke's Report on Gums and Resins 40 Atkinson's Gums and Gum resins 27 &c*) **Dr Dymock** however in his recent work on the *Materia Medica of Western India* attributes mócharas to **Bombax** but makes no mention of **Birdwood's** astringent gall like excrescences while discussing the properties of the Betel nut palm. **Dr Birdwood** affirms that 'all his attempts to obtain gum of any kind from **Bombax** completely failed in Bombay and he has no hesitation in saying that the red cotton tree affords no gum whatever' (*Cooke's Report*) **Dr Stewart** in his *Punjab Products* (p. 24) says 'The gum which exudes from the bark is given often with **Ægæ** for dysentery and diarrhoea. Several other more recent observers have however collected and described the gum obtained from **Bombax malabaricum** and there would thus seem no ground for doubting that **Bombax** is the chief source of the mócharas of our bazars. Indeed it is highly probable that the other gums sold under that name are only substitutes or adulterants. In an interesting letter addressed to the *Indian Forester* (Vol VIII 153) **Mr Baden Powell** gives a detailed account of a tree of **Bombax malabaricum** which in his private garden at Lahore yielded a quantity of mócharas. It appears that if the tree is artificially wounded this substance will not be produced. The formation of the gum is due to some functional disease and commences below the bark like a large swelling. After removing the mass of dark coloured and decayed mócharas **Mr Powell** watched closely the formation of new gum. He says 'To my surprise it issued in various shaped masses or worm like pieces as if one squeezed oil paint out of a tube this gradually curled up or coagulated into a mass as chance would have it. It consisted of a rather firm slightly translucent dirty whitish yellow jelly. To the taste it was almost insipid, but with a slight roughness indicating astringency. It proved wholly insoluble in cold water and nearly so in boiling water though I think it went into a pulp under such treatment. It did not appear either soluble in pure spirits of wine but imparted a red colour to the liquid.

This jelly when dried by the air and heat of the sun acquired a dark brown colour the surface dried first and the inner part gradually shrunk afterwards accounting for the blister like irregular pieces. **Mr Atkinson** in his *Himalayan Districts* says 'The gum of this tree is known as *mocharas*.

Dr Moodeen Sheriff, in his admirable Supplement to the Pharmacopœia of India attributes a portion at least of the mócharas to **Bombax malabaricum**, but makes no mention of the so-called *supari-ka phul*. He states that there are two varieties of the mócharas. Both occur in very irregular nodular smooth and shell like pieces opaque and dark brown in colour the difference being one is very hard and broken with difficulty and the other is brittle and easily broken and less astringent in taste. The latter is the inferior of the two and is the produce of **Bombax malabaricum**. No gum is produced from this tree on making incisions (how ever deep), but occasionally a very small quantity of it is exuded spontaneously. It is of a yellowish red or flesh colour at the beginning for some days, and then becomes deep brown. After some months it gradually and occasionally acquires the form I have described. This account was published in 1869, and it entirely concurs with **Mr Baden Powell's** personal observations published in the *Indian Forester* in 1882 from which an extract has already been given. The bulk of the evidence which has since come to light goes a long way to show that both forms of mócharas described by **Moodeen Sheriff** are in all probability derived from **Bombax**.

The following extract from **Dr Dymock's Materia Medica of Western**

The Kapok Fibre.

BOMBAY
malabaricum.

India (published 1883) will be found to convey the main facts known regarding *mocharas* —

DESCRIPTION — When first exuded it is a whitish fungous mass which gradually turns red and finally dries into brittle mahogany-coloured tears. The larger tears are hollow in the centre the cavity being produced during the gradual drying of the jelly like mass which first exudes. Dry *mocharas* when soaked in water swells up and resumes very much the appearance of the fresh exudation. The taste is purely astringent like tannin.

MICROSCOPIC STRUCTURE — *Mocharas* is not a simple juice but the product of a diseased action which consists in a proliferation of the parenchyma cells of the bark. Upon making a section of the diseased part a number of small cavities are seen which contain a semi-transparent jelly-like substance consisting of oblong cells with botryoidal nuclei. At the margin of the cavity the columns of healthy cells are seen breaking up and the cells separating to join the jelly-like mass; this gradually increases in size and finds its way to the surface to be extruded as *mocharas*. Upon its first appearance it is of an opaque yellowish white colour, firm externally but semi-fluid internally and there is no central cavity. The cause of the diseased condition of the bark which produces *mocharas* has not been determined.

COMMERCE — *Mocharas* is collected by Bheels and wandering tribes in Western India. It is sold by all the druggists. Value Rs 4 per Surat maund of 37½ lbs. The gum of *Moringa* (*shegva*) is frequently mixed with *mocharas* though similar in colour it may readily be distinguished by its weight and solidity.

Fibre — THE INNER BARK of the tree yields a good fibre suitable for cordage. The seeds yield the so-called red silk cotton or *smal* cotton, a fibre too short and too soft to be spun but largely used for stuffing pillows &c. It has also been talked of as a paper fibre. The smoothness of the cotton prevents cohesion or felting and hence in the textile industries this fibre could only be used to mix with others imparting a silky gloss to the fabric. A writer in *The Tropical Agriculturist* speaking of the *mbul* (which is either this tree or the white silk-cotton tree) says: "I believe this product (tree cotton) will become far more important than Ceara rubber. Civilization is rapidly opening its mind to the fact that *pulan* (the Singhalese for cotton wool) makes a sufficiently soft bed at a comparatively small cost while in it the manufacturers of gun-cotton have found a cheaper and equally efficient raw material as a succedaneum to that used formerly."

The Kapok Fibre — The demand for new fibres has recently directed attention to the subject of silk-cottons and it seems that the produce of two if not three very different trees have in Government reports and public newspapers been confused with each other. Much of what has or can be written regarding one of these fibres is probably applicable to the others but it seems desirable that they should be carefully distinguished. In a correspondence regarding silk substitutes from Messrs Manning Collyer & Co London forwarded to the Government of India by Her Majesty's Secretary of State silk-cotton or *kapok* was incidentally discussed. Samples of silk cotton were accordingly forwarded for examination with the result that Messrs Manning Collyer & Co reported that the *semul* cotton supplied them was better known as *kapok* and that there was but a small demand in England for the article. A considerable trade they added exists in Holland, where however the longer stapled qualities from Java are much preferred. The sample supplied being on the seed will lose very considerably in cleaning and the present estimated value is 2d to 2½d per lb possibly with regular

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FIBRE
Bark.
638
Cotton
639
Gun cotton
640

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B. 641

**BOMBAX
malabaricum****Mócharas as a Medicine**

supplies rather more might be obtained, say 3d a lb Mr Oollier speaking at a meeting of the Society of Arts (London 1883) said that the Dutch were far in advance of us in using silk-cotton At the Amsterdam Exhibition and in Holland Mr Oollier remarks that silk cotton fetches 8d a lb whereas in England only 2d can be got The quality of the fibre was however better In a further article in the *Journal of the Society of Arts* Mr Oollier goes into the subject of silk cottons and mentions several species but appears to have overlooked entirely the *simul* tree of India—**Bombax malabaricum**.

Through the kindness of Professor W T Thiselton Dyer of Kew I have seen a circular on the *kapok* fibre issued by Messrs J C Kutgen & Co, Rotterdam (dated November 1883) From this interesting paper it appears that the chief use of the fibre is in upholstery The *kapok* is however quite distinct from the *simul* and since the former fetches a much higher price than the latter it seems desirable that the two should be carefully distinguished in all experimental or commercial consignments The *kapok* is obtained from **Eriodendron anfractuosum** the white silk cotton while the *semal* is the fibre from the seeds of **Bombax malabaricum**, the red silk cotton Since both trees occur abundantly in India to participate in the new and apparently considerable trade in *kapok* all that seems necessary is for India to direct its attention to the correct plant

The following brief notice of the Indian silk cottons may help to remove ambiguity but the reader is referred for fuller details to the accounts given under each in their respective alphabetical positions in this work The plants are enumerated in the order of probable merit

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1st—Eriodendron anfractuosum, DC**THE KAPOK OR WHITE SILK COTTON**

This is particularly plentiful in the Konkan but it grows in most parts of India and its cultivation could be extended As a road side tree while affording shade it might be made to yield a distinct revenue to the country

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2nd—Bombax malabaricum DC**THE SIMAL OR RED SILK COTTON**

This is the commonest of the silk cotton trees occurring throughout the peninsula but more particularly in the eastern side and ascending the hills to 4 000 feet in altitude

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3rd—Cochlospermum Gossypium, DC**THE KAMBI OR GALGAL**

A common tree of the lower hills of India from Garhwál Bundelkhand Behar Orissa, and westwards to the Deccan It has large yellow flowers and is not uncommon in cultivation throughout the country especially in South India It does not appear that the samples of this form of silk cotton have been consigned to Europe and declared as such so that its peculiar merits have not been definitely determined

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4th—Calotropis gigantea—the *Madar* and other ASCLEPIADACEÆ and APOCYNACEÆ—yield silky hairs—the coma of the seeds These are generally classed as silk cottons but with the exception of *madar* none of these fibres have as yet been experimented with The natives of India regard the *madar* silk-cotton as much cooler than *simul* and affirm that it has a soothing effect

OIL.

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FOOD

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Oil—Oooke, in his *Oils and Oil seeds* makes mention of this plant as yielding an oil, but gives no other information about it

Food—The flower buds are eaten as a pot herb

The Assistant Commissioner of Balaghat in Mr Liotard's note on

B. 647

Mócharas as a Medicine

BOMBAX
malabaricum.

Mahua, says that this constitutes a regular article of food "Of the minor forest produce about 5 000 maunds of *simal* are used as food ' Monkeys eat the young flower buds (*Ulwar Gas* 32)

Fodder—The leaves and twigs are lopped for fodder

Medicine.—THE GUM or dried juice *mocha ras* which the tree yields is used as an aphrodisiac This gum contains a large proportion of tannic and gallic acids and may be successfully employed in cases requiring astringents It has also tonic and alterative properties it is regarded as a styptic, and is used in diarrhoea dysentery and menorrhagia In Rewa Kantha Gujarát this gum is known as *kímarkas* it is ground to powder and drunk in milk as a tonic (*Bomb Gas* VI 14) The gum of the *semul* tree *mocha ras* is given to children as a laxative and the dried flowers are used as demulcent (*Irvine*) The dry flowers with poppy seeds goat's milk and sugar are boiled and inspissated and of this conserve two drachms are given three times a day in hæmorrhoids (*Medical Topography of Dacca by Dr J Taylor* 56)

A decoction of the root gives a gummy substance used in the Deccan as a tonic medicine May not part of the *mócharas* sold by our druggists be this resinous extract? The roots have stimulant and tonic properties attributed to them They have come to bear the name of *musla* but this must not be confused with *saféd musli* The *Pharmacopæia of India* while not exactly making this mistake publishes a note regarding *saféd musli* under **Bombax** and then proceeds to say that the roots sold under that name appear not to belong to **Bombax**, but to be the roots of some monocotyledonous plant Both *musla simal* and *saféd musli* exist however and have separate properties attributed to them The *Ulwar Gazetteer* says (page 32) The roots of this plant are called *musla* and they are much used in medicine *Musli sembal* is a light woody fibrous root of a brownish colour with a thin epidermis easily detached, and a very fibrous thick tuber It acts as a stimulant and tonic and some consider it in large doses emetic It is said to contain 10 per cent of resin (*Baden Powell Panjab Products* I 333) The young roots dried in the shade and powdered form the chief ingredient in the *musla semul* a medicine highly thought of as an aphrodisiac it is also given in impotence

THE BARK AND THE ROOT are also emetic THE LEAVES are made into a paste and used as an external application

Special Opinions.—§ Its gum (*mócharas*) is useful in diarrhoea of children dose 20-30 grains with equal parts of sugar (*Surgeon J Anderson M B Bijnor*) The tap root of the young plant is used for gonorrhoea and dysentery (*Surgeon Major P N Mukerji Cuttack Orissa*) The leaves singed and beaten or rubbed with water to a pulp make a useful application for glandular swellings (*Mr W Forsyth Civil Medical Officer Dinajpore*)

Structure of the Wood.—White when fresh cut turning dark on exposure very soft, perishable no heartwood no annual rings The wood of old trees is often of a dull red colour It is not durable except under water when it lasts tolerably well

It is used for planking packing-cases and tea boxes toys scabbards, fishing floats, coffins and the lining of wells In the Konkan Bengal, and Burma, the trunk is often hollowed out to make canoes and water troughs

Dr Buchanan says it is the timber commonly employed by the natives of Behar for making doors and window shutters for it lasts well in such situations and is very strong to resist the attacks of robbers (*Statistics of Dinajpore*) It is used as firewood in the Konkan (*Bomb Gas* X, 40)

FODDER
648
MEDICINE
649

GUM
650

Flowers
651
Root
652

Extract from
Root.
653

Bark
654

Leaves.
655

TIMBER.
656

BORAGINÆÆ

The Borage Family

DOMESTIC
Tinder
657

Domestic Uses—The cotton is made into tinder The tree is often mentioned in the Vedas It is the Yamadrumba or tree of Yama the Indian god of Death

Bonduc, see *Cassalpinia Bonducella*, *Roxb* I EGUMINOSÆ

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BORAGINÆÆ

Herbs shrubs or trees often hispid or scabrous *Leaves* alternate very rarely opposite exstipulate mostly entire *Flowers* usually in dichotomous scorpioid cymes rarely solitary and axillary *Calyx* inferior 5 rarely 6 8-toothed or lobed usually persistent in fruit *Corolla* gamopetalous often with scales in the throat rarely 4 6 lobed imbricate (rarely twisted) in the bud *Stamens* as many as the corolla lobes alternate with them upon the corolla tube *Ovary* superior cells 2 2 ovuled or 4 1 ovuled style terminal or from between the ovary lobes long or short stigma capitate or 2 lobed rarely the style twice bifid ovules sub erect from the inner basal angle of the cell *Fruit* drupaceous or dividing into 2 4 nutlets *Seeds* erect or oblique testa membranous albumen fleshy copious sparing or 0 embryo straight or curved radicle superior Species 1 200 throughout the world

Tribe I Cordiææ Trees or shrubs *Style* terminal on the entire ovary twice bipartite *Drupe* 4 1 seeded albumen 0 cotyledons plicate longitudinally
Calyx teeth very short irregular 1 *Cordia*.

Tribe II Ehretiææ *Style* terminal on the entire ovary simple bipartite or styles 2 *Drupe* with 2 2 celled or 4 1 celled pyrenes or of 4 1 nuts
Trees or shrubs *Style* 2 fid 2 *Ehretia*.
Prostrate herb *Styles* 2 3 *Coldenia*.
Virgate shrub *Style* 1 stigma capitate 4 *Rhabdia*

Tribe III Heliotropiææ *Style* terminal on the entire ovary depressed—conic at the apex or with a horizontal ring below the stigmas
Fruit as of Ehretiææ

Shrubs often scandent *Style* short shortly
2 lobed 5 *Tournefortia*
Herbs style dilated at the apex or above the base 6 *Heliotropium*

Tribe IV Boragææ Herbs *Style* simple or bifid rising from between the ovary lobes (except in *Trichodesma*) *Nutlets* 4 rarely 3 1 by suppression (2 in *Rochelia*) albumen 0

Sub-tribe I Cynoglossææ *Nutlets* attached to a convex or conical carpophore scar continued to the apex of the nutlets which are often depressed produced or saccate at the base

* *Fruiting calyx enlarged enclosing the nutlets*

Anthers conically convenient lanceolate subexsert 7 *Trichodesma*

** *Nutlets depressed their bases produced downwards*

Stamens included *Nutlets* obovoid scar punctiform 8 *Actinocarya*

Stamens included *Margins* of nutlets reflexed over their backs 9 *Omphalodes*

Stamens included *Nutlets* obovoid glochidiate 10 *Cynoglossum*.

Stamens exserted anthers large linear oblong 11 *Lindefolia*.

Stamens exserted anthers small shortly oblong 12 *Solenanthus*

*** *Nutlets connate forming a pyramidal fruit, margined hardly produced downwards*

Racemes ebracteate *Margin* of the nutlets glochidiate often reflexed

13 *Paracaryum*.

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The Borage Family

BORAGINÆ

- Racemes bracteate Margin of the nutlets gloch
 idiate scarcely reflexed 14 *Echinosperrum*.
- Sub tribe II Eritrichiæ** Nutlets attached to a convex or conical car-
 pophore scar in the middle or lower half of the nutlets which are
 not depressed at the base but are produced at the apex above the
 scar free round the base of the style
- * Scar in the basal half of the nutlet
- Racemes ebracteate Nutlets 4 15 *Eritrichium*
 Racemes bracteate Nutlets 2 1 seeded 16 *Rochelia*
- ** Scar in the middle of the inner face of the nutlets
- † Scar small without a prominent thickened incurved mar-
 gin
- Flowers axillary subsessile Fruiting calyx en-
 larged 17 *Asperugo*
 Almost stemless Fruiting calyx not enlarged 18 *Microula*
- †† Scar depressed with a thickened incurved margin
- Flowers axillary pedicelled 19 *Bothriospermum*
 Flowers axillary subsessile 20 *Gastrocotyle*
- Sub-tribe III Anchuseæ** Nutlets on a flat or nearly flat receptacle
 scar basal prominent hollowed out with a prominent thickened
 margin
- * Corolla throat closed by 5 scales
- Corolla tube straight 21 *Anchusa*
 Corolla tube curved 22 *Lycopsis*
- ** Corolla throat naked or hairy within but without scales
- Racemes dense Calyx large 23 *Nonnea*
- Sub tribe IV Lithospermeæ** Nutlets on a flat or nearly flat receptacle
 scar basal but little hollowed out without a prominent margin
- * Racemes ebracteate corolla lobes distinct
- Corolla tube cylindric Anthers included 24 *Mertensia*
 Corolla tube cylindric Anthers exerted 25 *Moltkia*
 Corolla tube short Nutlets tetrahedral 26 *Trigonotis*
 Corolla tube short Nutlets ovoid oblong 27 *Myosotis*
- ** Racemes bracteate corolla lobes distinct
- Corolla throat naked or with small scales 28 *Lithospermum*
 Corolla throat densely filled with hairs 29 *Sericostoma*
 Hispid spreading herbs Corolla yellow tube
 elongate 30 *Arnebia*
 Sub-erect herbs Corolla purple tube elongate 31 *Macrotoma*
- *** Corolla lobes reduced to minute teeth
- Anthers lanceolate connivent in a cone 32 *Onosma*

The preceding extract from the *Flora of British India* will doubtless be found useful to the student of Economic Botany. It will at least serve to direct his attention to the names of Boraginaceous genera, to identify which it will however be necessary to consult the *Flora* since an analysis can at most isolate the tribes or more marked genera and is of use only when the reader possesses a perfect and typical specimen. As formed at the present day the Boraginæ may briefly be said to embrace two very different groups of plants the one tropical or warm temperate trees shrubs or herbs and the other temperate or extra-tropical herbs. This is not absolutely correct but it is so far so as to make a statement of the distribution of the Indian Borageworts somewhat misleading. The herbaceous or

**BORAGO
indica.****The Borage Family**

what may be called the true or more typical Boragineæ (the members of the tribe Borageæ) are almost entirely temperate. They abound in the southern part of Europe the Levant and the temperate regions of Asia. They are less frequent in northern latitudes, and almost disappear from the tropics. This fact is so well known—the Forget me nots being viewed as a most typical feature of the temperate regions—that an analysis of the Indian species of Boragineæ will assign to the plains a very misleading proportion, but it must be borne in mind that these belong chiefly to the tribes Cordieæ Ehretieæ and Heliotropieæ which might be viewed as constituting a separate order and indeed the Cordieæ have been treated as such by many authors.

In Boragineæ there are in all 1 200 species of which India possesses 139. Of the latter 51 or 36·7 per cent are confined to the plains 25 or 20·1 per cent ascend to 5 000 feet in altitude 30 or 21·6 per cent to 10 000 feet and 30 or 21·6 per cent are met with above that altitude. Thus 51 are tropical and 98 temperate. This is an approximately correct statement only since some of those included in the second group ascend from the plains to the hills and thus overlap the division into tropical and temperate.

Their distribution over India shows a corresponding temperate character the majority occurring in the North West Provinces and the Panjáb the plains of which are much colder than the plains of the eastern side of India and have accordingly a much larger number of species especially of cold season annuals. The eastern side of India has 24 species or 17·2 per cent. South India 14 or 10·0 per cent. Western India 11 or 7·9 per cent. Sind 6 or 4·3 per cent and the Panjab and North West Provinces 59 species or 42·4 per cent. Distributed over two or more of these divisions—that is occurring throughout India—there are 25 species or 17·9 per cent. Nearly all the species thrown into this last group are distributed to North India (i.e. Panjab and North West Provinces &c.) so that it is quite clear that the region of Boragineæ as far as India is concerned must be viewed as the hills plains and mountains of the northern section of the empire.

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The affinities of the Boragineæ are with Labiateæ and Verbenaceæ but they form so well marked an assemblage that it is not necessary to enter into this subject. The Cordiaceæ differ from the more typical Boragineæ in being arborescent and in having a twice forked terminal style baccate fruit and plaited cotyledons.

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Properties and Uses—Few are of any very great importance. Many species contain a mucilage to which is often combined a bitter astringent principle. The Comfrey root (*Symphytum officinale*) was formerly used in hæmoptysis. The Boragos are regarded as diuretics. Cynoglossum yields a poisonous narcotic root. The sweetly scented Heliotrope (*Heliotropium peruvianum*) belongs to this natural order and so of course do the favourite Forget me nots (*Myosotis*). The fruits of some of the Ehretieæ are edible and the roots of *Anchusa* *Onosma* *Alkanna* and *Arnebia* afford the dye Alkanet. One of the most curious and interesting members of this order is the drug sold in India under the name of *Gaosaban* which recent investigation seems to have proved to be a species of *Echium* it is imported from Persia. Some doubt also prevails as to the drug *Rattanjot*. While various substances are sold under that name the true article appears to be the root of some Boraginaceous plant very probably a species of *Onosma*.

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BORAGO, Linn Gen Pl, II 854

Borago indica, Linn (as in Roxb, Fl Ind, Ed C B C, 854

Syn for *Trichodesma indicum* Br which see

B 661

The Palmyra or Fan Palm

BORASSUS
flabelliformis.

Borago zeylanica, Linn, see *Trichodesma zeylanicum*, Br Fl Br Ind IV, 154

BORASSUS, Linn Gen Pl III 939

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An erect graceful palm with a terminal crown of fan-shaped leaves belonging to the tribe BORASSEÆ of the Natural Order PALMÆ. It is a native of Africa but at the present day exists in a state of cultivation throughout India. It is almost unnecessary to give an enumeration of the generic characters of this well known palm. There is only one species and as far as the plains are concerned it is the only palm with fan-shaped leaves. The flowers are dioecious occurring in panicle spikes. male thick cylindrical flowers fasciculate in the axils of broad whorled imbricate connate bracts ovary 3-celled.

The generic name is *βορσος* the Greek name for a palm fruit

Borassus flabelliformis, Linn PALMÆ

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THE PALMYRA PALM, BRAB TREE

Vern—*Til tala tar tari* HIND *Tal* BENG *Tale* SANTAL *Tad tud nu jhada* GUJ *Dral or tad* SURAT, *Tar kahhar tar* DUK *Taticha jhada tada, talat mad* MAR *Potu tati* (the male tree) *penti tati* (the female) *tati chettu* TEL *Panas maram* or *panna maram* *panam panne pampai* (P) TAM *Iana* MAL *Tall tule pane mara* KAN *T la Sans Darakhte tari* PERS *Tal gass Tal* SINGH *Htan tan* BURM

Habitat—A tall palm with cylindrical stem cultivated throughout tropical India and beyond the tropics in Bengal and the southern part of the North West Provinces. The young stems are covered with dry leaves or rather with the lower part of the petioles while the old stems are marked with the hard black long and narrow scars of the fallen petioles. In Upper India it is chiefly seen on embankments around tanks but in Bengal it luxuriates in the mixed cocoanut and date palm jungles. Brandis says it extends up both sides of the Persian Gulf attaining about the same latitude as in North West India. It is also cultivated in Prome in Ceylon and in the Indian Archipelago. It thrives in this district although it never grows spontaneously and is finely adapted for covering the naked sides of tanks which are now almost entirely useless (*Buchanan's Statistics of Dinajpore* p 150)

Synopsis of the Economic Uses—Every part of this plant is made use of in some way or other. A Tamil poem enumerates some 800 uses to which the various parts are put. *The Tropical Agriculturist* (June 1884) publishes a list of the more important of these uses enumerated by Mr Robert O D Asbury of Jaffna. Ceylon arranged in seven groups as follows. Group I Wooden utensils. Group II Food materials. Group III Leaves. Group IV Fibre. Group V School things and toys. Group VI Toddy drawers utensils. Group VII Miscellaneous.

THE GUM

Gum—A gum obtained from this palm is said to have been sent from Madras to the Panjáb Exhibition. It is black and has a shining fracture.

FIBRE

Fibre—The fibre extracted from the leaf stalks is used for rope and twine making and may also be used for paper. This fibre is strong and wiry and is about 2 feet long. In Ceylon it is extracted and the ropes and string largely used for cattle yokes and other agricultural purposes are made of it. In Madras it is also made into rope and twine. In Bengal the trees are too scattered to admit of an extended trade in this fibre. The long cord like and dark-coloured fibro-vascular bundles are carefully extracted, however while preparing dug outs &c. By the

B 667

GUM.
665FIBRE
666Wood fibre.
667

BORASSUS
flabelliformis.**The Palmyra,**

Coir
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Baskets
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Braid
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Mats
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Thatch.
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MEDICINE
Juice
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Ash
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Bud
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Root.
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Toddy
Poultice.
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Petioles
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Fruit pulp.
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Cotton.
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fishermen these are made into invisible fish traps For this purpose they are platted into a long tapering tube the meshes of which are 2 inches in size This tube is placed in a dividing wall of weeds run across the tank it thus forms what appears a natural and apparently easy passage from one expanse of water to another At the end of the passage is placed however a noose made also of the *tar* fibre In darting through the passage this trap is so arranged that the fish must run its head into the noose and is thus firmly secured The fishermen put the *tar* fibre through some process of preparation but it is not spun or twisted in any way a single thread or fibro-vascular bundle being used

Coir or fibre from the pericarp is doubtless prepared in many parts of India but no definite information can be obtained The leaves are made into fans or worked into boxes and baskets and into many minor objects amongst these may be mentioned a braid platted of thin strips of the leaves and used for ornamental purposes They are also extensively used for thatching huts

§ Ropes for country craft are made from the leaf and leaf stalks mats are also made from them and the hoods which labourers wear in the monsoon called in Mahratta *Khor* The leaves are also used for thatching huts (*Surgeon Major W Dymock Bombay*)

MEDICINE

Medicine—The JUICE of this plant is used as a stimulant and antiphlegmatic When freshly drawn it is exceedingly sweet and if taken regularly for several mornings in succession acts as a laxative It is also useful in inflammatory affections and dropsy The fermented juice called *tari* or toddy is intoxicating The ASH of the dry spadix is an *antacid* in heartburn U C Dutt says that it is regarded by the Hindus as useful in spleen The terminal BUD of the *tal* tree is regarded as nutritive diuretic and tonic The ROOT is regarded as cooling and restorative (U C Dutt) A useful stimulating application called TODDY POULTICE is prepared by adding fresh drawn toddy to rice flour till it has the consistency of a soft poultice and this being subjected to a gentle fire fermentation takes place This spread on a cloth and applied to the affected part acts as a valuable stimulant application to gangrenous ulcerations carbuncles and indolent ulcers (*Drury's Useful Plants*)

The juice of the FRESH PETIOLES is given as a stimulant antiphlegmatic and is used by native physicians as an adjunct to stimulating drugs in the low stages of intermittent and remittent fevers The PULP of the ripe fruit is applied externally in skin diseases (*Babu T N Mukerji in his Amsterdam Catalogue*) The light brown COTTON LIKE SUBSTANCE from the outside of the base of the fronds is employed by the Singhalese doctors as a styptic to arrest hæmorrhage from superficial wounds

Special Opinions—§ Vinegar toddy and a spirituous liquor are made from this tree The juice slightly fermented is used in diabetes The ash of the spadix is given internally in bilious affections (*Surgeon G A Emerson Calcutta*) The expressed juice of the leaf stalk and young root is used in cases of gastric catarrh and to check hiccup The fresh juice is diuretic and used in gonorrhœa The fermented juice is uncertain in its action and sometimes acts as a drastic purgative (*Brigade Surgeon F H Thornton B A M B Monghyr*) Fresh juice is cooling and is considered as a luxury in the hot season (*Assistant Surg on Shib Chunder Bhattachary Chanda Central Provinces*) An extract of the green leaves is used internally in secondary syphilis (*Surgeon Major F F L Ratton M D, Salem*) The fresh juice obtained by cutting the spadix is a good diuretic and is useful in cases of dropsy The fermented

of Fan Palm.

BORASSUS
flabelliformis.

juice (toddy) is used as yeast in baking bread it is very intoxicating (Surgeon J Anderson M B Bijnor) Water contained in the cavities of the pulp when unripe is used as a remedy for nausea and vomiting The water is sweetish in taste (Assistant Surgeon Anund Chunder Mukerji Noakhally) The palm seeds when immature contain a milky fluid which is sweetish and cooling It is often given to prevent hiccup and sickness (Surgeon Major R L Dutt M D Pubna) The fruit is cooling and useful in relieving thirst in fever (Surgeon Major A S G Jayakar Muskat Arabia) Mixed with aromatics the unfermented saccharine juice taken in the mornings is a good tonic in emaciation of the body where the patient can digest it (Native Surgeon T Ruthnam Moodelliar Chingleput Madras) The ash of dry spadix is largely used with other drugs by *kaberajes* as an antiperiodic it is feebly so (Assistant Surgeon Devendro Nath Roy Sealdah Calcutta)

FOOD

The Juice, Toddy, and Sugar

By far the most important product of this plant is the juice—*Ras*—obtained on tapping the flower stalk This before sunrise is sweet and agreeable to the taste and while fresh is either consumed as a beverage or boiled down to sugar In the Madras Presidency the quantity of jaggery sugar made from the juice of this palm is very considerable After sunrise the juice rapidly ferments however and is then converted into toddy—*tari*—an intoxicating drink Dr Ainslie (*Mat Ind I p 451*) describes four kinds of toddy which were prepared in his time but makes no mention of the date palm toddy He gives preference to cocoanut palm juice after that to palmyra then the toddy from *Caryota urens*, and last of all that from the *Nim* tree In most parts of India toddy is extracted from some palm or other but in Bengal one might almost say the date palm was exclusively used for this purpose The Palmyra on the other hand is the toddy palm of South India of the Konkan of Burma and of Ceylon

Definite information cannot however be obtained regarding the amount of Palmyra toddy or of the sugar actually prepared in India since in the returns given for this substance separate records are not kept of the trees from which the palm toddy and sugar are obtained In another part of this work under the heading Toddy further details will be given but the following abstract may be found useful —

(1) The fresh juice is called *ras* If not consumed before sunrise it turns milky and rapidly ferments

(2) The fresh juice if boiled down yields molasses or *jaggery* from which sugar may be refined The juice collected for this purpose has a small piece of lime placed in it to prevent fermentation while suspended from the tree

(3) The fermentation is accelerated by placing in the liquid what are known as fermentation seed—that is rice saturated with old or fermented *ras* The fermented liquid is called *toddy* or *tari*

(4) If distilled palm wine or *arak* is the result

(5) By destructive distillation a good quality of vinegar is produced from the juice

The various methods of extracting the juice and of preparing either of the five substances above briefly enumerated will be best shown by republishing from standard authors an account of the industry as practised in Madras Bombay Ceylon Burma and Bengal —

The mode of procuring the vinous sap is as follows The spadix or young flowering branch is cut off near the top and an earthen *chatty*

MEDICINE

FOOD
682THE JUICE
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Juice or Ras
684
Molasses or
Jaggery
685
Refined
Palmyra
Sugar
686
Toddy or Tari
687
Distilled Spirit
or Arrack.
688
Vinegar
689

**BORASSUS
flabelliformis****The Palmyra,****THE JUICE****MADRAS
690**

or pitcher then tied on to the stump into this the juice runs. Every morning it is emptied and replaced the stump being again cut the vessel placed as before, and so on until the whole has been gradually exhausted and cut away. It is known in Tamil as the *Pannungkhulloo*. It is from this liquor that sugar is extracted and by the same process as that described for procuring the toddy except that the inside of the earthen vessel or receiver is powdered with chunam which prevents any fermentation the juice is then boiled down and dried by exposure. Some few trees that from unknown causes do not flower in spring put out their flowers in the cold season and give a scanty supply but in spring many are rendered artificially barren by breaking off the flowering bud as it begins to form. These also flower in the winter season and are called *Basanti*. They do not give above $2\frac{1}{2}$ maunds of juice but this is of as much value as the 6 maunds which a tree gives in spring. Either the male or female will answer for the spring or winter crop but the female alone will yield juice in the rainy season. When this is wanted the fruit is allowed to form and afterwards the point of the spadix or stem which supports the clusters is cut and allowed to bleed' (*Drury Useful Plants p 83*)

**BOMBAY
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In the Konkan, Thána District 'the fan palm is the chief liquor bearing tree. It grows wild all over the district and is found by tens of thousands in the coast sub divisions. The trees are of different sexes the male being called *talai* and the female *tad*. The juice of both is equally good. The trees are also known as *shiloti dongri* and *thal sani* according as they have been planted by the owner or grow on uplands or on lowlands. Fan palms artificially reared grow rather more quickly than wild ones. The ground is not ploughed but a hole about a foot deep is made and the seed buried in it in *Jeshth* (May June). No watering is necessary and the only tending the plant requires is the heaping of earth round the base of the stem to quicken the growth. In about twelve years it is ready for tapping and will yield liquor for about fifty years or as the saying is to the grandson of the man who planted it. In the case of the male palm *talai* the juice is drawn from the *lendis* which are finger like growths, from twelve to fifteen inches long given out in clusters at the top of the tree. Some of the fingers in the cluster are single others spring in threes from a common base. Each finger is beaten with a piece of stick called a *tapurni* three times in three lines along its whole length and all the fingers of the cluster are tied together. In three or four days the points of the fingers are cut by the *aut* a sharply curved knife with a keen flat and broad blade. The points are cut daily for about a fortnight when the juice begins to come. Under the tips of the fingers earthen pots are placed into which the juice is allowed to drop and to keep off the crows a sheath of straw is bound round the *lendis* so as to close the mouth of the jar. The female tree gives out spikes from twelve to fifteen inches long with the fruit seated all round the sides of the spike as in a head of Indian-corn. The spikes are known as *sapat koti gangra* and *pends* according as the juice issues when the berries, *tadgolas* are still minute fairly grown or very large. In trees which yield juice while the berries are still very small *sapat koti* the spike is beaten and on the third day its point is cut and the sides rubbed with the hand so as to brush off the incipient fruit. In ten or twelve days the juice begins to drop. In trees which yield juice when the spike is fairly grown *gangra* the spike must be beaten on the interstices between the berries with a long stone, called a *dagdi gunda*, or if the interstices are very fine with an iron pin called *lokhandi gunda*. On the third day the tip is cut, and in about fifteen days the juice begins to flow. In trees which

or Fan Palm

BORASSUS
flabelliformis.

THE JUICE

BOMBAY

yield juice when the fruit is large *pendi* the parts of the spike visible between the berries are beaten in the same way and a month afterwards the end of the spike is cut daily for about a fortnight when the juice generally begins to come. As the *gangra* and *pendi* are cut the fruit on the sides has to be gradually removed. A fan palm tree will yield from six to sixteen pints (three to eight *shers*) of juice every twenty four hours. Almost the whole is given off during the night. When the juice has begun to flow the fingers of the male tree and the spike of the female tree must have their points cut morning and evening. The distillation of palm juice is simple. The juice is put into an earthen jar *madka* and allowed to stand for five days. It is then placed over a fire and the spirit rising as vapour passes through a pipe into another jar into which it is precipitated in a liquid form by the action of cold water. One hundred *shers* of juice yield about twenty five *shers* of spirit. (*Bomb Gaz Vol XIII Pt I pp 22 23*)

In Kolaba District with few exceptions these palms are self sown and no care is taken of them except that a few thorns are some times set round seedlings to keep cattle away. The tree is full grown at twenty five or thirty years. It is tapped for about thirty years more and is said to live about forty years after it has grown too old to be tapped. Both the male and female trees are tapped. The spathe *pogi* of the male tree is called *lendi*. Vigorous trees throw out from three to five spathes a year some in November *sargacha hangam* and the rest in February *bhâr kala*. Trees that are not in full vigour throw out spathes in November only. The spathe is gently bruised with a piece of wood the bruised parts bound together a slice is cut off the point of the spathe by the drawer's sharp and broad bladed knife *âut* and a pot is tied over the end to catch the juice. The tree is then tapped twice a day a little slice being cut off the end of the spathe at each tapping. Under this process each spathe lasts according to its length from a month to a month and a half. The tapping season continues from October to May. The drawer is paid at the rate of 1s (8 annas) a month for each tree. Each tree yields about 3½ pints (1½ *shers*) a day which at 1½d the pint (6 pies the *sher*) is worth 1½d (9 pies) or 2s 9½d (Rs 1 6 6) a month. Taking five months as the average time during which tapping lasts the approximate gross profits are 14s (Rs 7). Deducting from this 6s (Rs 3) paid to Government and 5s (Rs 2 8) to the *Bhandari* the net profit on each tree is about 3s (Rs 1 8). This was the state of affairs before 1879-80 when the tree tax was raised to 12s (Rs 6) since this change the tapping of palmyra trees has ceased except in Alibâg. Palmyra juice can be distilled but this is never done as the supply of cocoa palm liquor is in excess of the demand. (*Bomb Gaz Vol XI p 29*)

Little more than 20 years ago the Bombay Government becoming alarmed at the amount of spirituous liquor which was consumed gave orders that in Surat large numbers of this noble tree and of the date palm should be destroyed. But in 1868 the total number of toddy yielding trees was estimated at 1 243 711 of which 47 810 were palmyra palms. (*Bomb Gaz II 39*)

The following extracts from *Simmonds Tropical Agriculture*—originally written by Mr W Fergusson—will be found to convey the more important facts regarding the extraction of toddy as practised in Ceylon—

'At the season when the inflorescence begins to appear when the spathes have had time to burst the toddy drawer' is at work in the palmyra groves. His practised eye soon fixes on those trees fit for the 'scalping knife,' and if they have not dropped the foot stalk

CEYLON.
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flabelliformis.****The Palmyra.****THE JUICE
CEYLON**

of the leaves the first operation if the trees are valuable is to wrench them off "An expert climber can draw toddy from about forty trees in a few hours In Jaffna a distinction is made between toddy and sweet toddy the former called by the Tamils *culloo*, is the fermented the latter the unfermented juice

The juice of the palmyra is richer in saccharine matter than that of most other palms in consequence perhaps of the tree more generally growing in dry sandy soil and in a dry climate The great fault of the jaggery made at Jaffna seems to arise from the too free application of lime a small quantity of which is absolutely necessary to prevent fermentation

According to **Forbes**, three quarts of toddy will make 1 lb of jaggery **Malcolm** remarks that jaggery resembles maple sugar and that in the neighbourhood of Ava 1 lb sells for the third of a penny In Jaffna 3 lbs are sold for 2d The usual process of making jaggery as pursued at Jaffna is exceedingly simple The sweet toddy is boiled until it becomes a thick syrup a small quantity of scraped cocoanut kernel is thrown in that it may be ascertained by the feel if the syrup has reached the proper consistency and then it is poured into small baskets of palmyra leaf where it cools and hardens into jaggery In these small plaited palmyra baskets it is kept for home consumption sent coastwise chiefly to Colombo or exported beyond seas to be refined To make *vellum* or crystallized jaggery which is extensively used as a medicine the process is nearly the same as for the common sugar only the syrup is not boiled for so long a period

Toddy serves extensively as yeast and throughout Ceylon no other is employed by the bakers large quantities of it are also converted into vinegar used for pickling gherkins limes the undeveloped leaves of the cocoanut and palmyra trees and other substances but by far the greatest quantity is boiled down for jaggery or sugar About 1 000 tons are said to be manufactured of it in Ceylon (*Tropical Agriculture Simmonds 265*)

**BURMA
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Dr Brandis says 'The most valuable produce of the tree is the sweet sap which runs from the peduncles cut before flowering and collected in bamboo tubes or in earthen pots tied to the cut peduncle Nearly all the sugar made in Burma and a large proportion of the sugar made in South India and the Konkan is the produce of this palm

**BENGAL
694**

The practice of extracting juice from the *tal* palm is almost unknown in Bengal or at all events it is rarely if ever done the date palm taking its place Sugar is accordingly not made from this palm in Bengal but sugar-candy manufactured from it is imported into Calcutta from Ceylon Madras and the Archipelago This is chiefly used in medicine as a remedy for cough and pulmonary affections' (*Babu T N Mukerji*)

The Fruit and Seed**695**

The tree flowers in March and the young fruits ripen in April and May and the mature fruits in July and August These are about 5 7 inches in diameter green when young but becoming brownish black shaded with yellow as they mature They form large clusters in the axils of the upper leaves Normally each fruit contains three nuts or by abortion only one or two The pericarp consists of three distinct layers *viz* the epicarp or outer skin of the fruit the mesocarp or fibrous and succulent layer within the epicarp and last of all the stony endocarp or shell of each nut Within the shell occurs a large solitary seed, which consists of a thin seed-coat in contact with the shell on the one side and with a layer of albuminous matter on the other When young, the interior of the albumen is filled with a jelly like fluid As it matures, this

or Fan Palm.

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flabelliformis**

albumen becomes hard and firmly attached to the shell the liquid being deposited with the growth of the embryo. Ultimately the embryo fills completely the central space taking the place of the liquid now deposited as albumen.

It has been thought desirable to give the above detailed description of the structure of this fruit in order to remove the ambiguity which exists regarding the economic uses of its various parts.

THE UNRIPE FRUIT—About April to May a certain number of the fruits are removed from the trees. The epicarp and mesocarp are removed and rejected the shell is split open and the seed obtained. This constitutes the edible structure sold in Bengal under the name of *talsans*. The soft albumenous layer and the jelly like fluid contained within it are eaten fresh being regarded as cool and refreshing. They are sometimes cut into small pieces and flavoured with sugar and rose water in this condition they are viewed as a delicacy. In India it is very rarely the case that either the fresh seed or the above preparation from it is eaten by Europeans.

THE RIPE FRUIT—In July and August when the fruits are ripe they are removed from the tree. The mesocarp or succulent and fibrous layer after being passed through a preparatory process is eaten as an article of food. The yellow pulp surrounding the seeds of the ripe fruit is sweet heavy and indigestible. It is extracted by rubbing the seeds over a wooden scratcher and with the addition of a little lime it settles into a jelly which is a ready mode of taking the pulp. It is also made into cakes with flour and other ingredients. (*U C Dutt Hindu Mat Ind. 249*) By seed in the above passage should be understood not the fibrous tissue which ramifies through the succulent mesocarp is attached to the endocarp or shell of the nut. The succulent pulp scraped away from this tissue has a peculiar odour and is sweetish it is either eaten raw or is mashed and strained with a little flour and sugar completely mixed up to form a mass and is then made into small flat cakes and fried in *ghu* or mustard oil the cakes are known as *patali* or *pitha*.

In order to make the first kind of cake (*patali*) the scraped pulp is mixed with lime and cocoanut spread evenly on a plate in which it is allowed to stand for an hour after which it is found in a solid state owing to the effect of the lime on the pulp. In order to make *pitha* the pulp is mixed with rice or wheaten flour and then fried in oil. In Bengal *tal* pulp is not preserved does not form an important article of food and there is no trade in it. In short the *tal* occupies a very unimportant place among the Bengal fruits. (*Babu T N Mukerji Revenue and Agricultural Department*)

In Ceylon this pulp is known as *Punatu*. The pulp of the fruit is preserved for use in the following manner. The ripe fruits are put into baskets containing water and are then squeezed by the hand till the pulp forms a jelly. Layers of this jelly are spread on palmyra leaf mats to dry on stages. Layer after layer is deposited to the number of about fifteen. These are left in the sun about a fortnight or three weeks only covered at night and protected from the dew and rain. The best sort is called *Pimatos* and the tough withery kind made from the remaining fruits gathered at the end of the season which is much in favour *Tot Punatu*. *Punatu* is sold by the *mat* at 3s to 6s each and is the chief food of the islanders of Ceylon and of the poorer classes of the peninsula for several months of the year. (*Tropical Agriculture Simmonds 267*)

GERMINATED SEED—After scraping off the succulent tissue of the mesocarp the nut are found to be perfectly solid and so hard that it is almost impossible to break them. If thrown aside in a heap or buried in

Seeds
696
Talsans.
697
Preserves
698

Fruit
699
Pulp
700

Patali Cakes
701

Punatu
702

VEGETABLE
Young
Seedling
703

**BORASSUS
flabelliformis****The Palmyra,****Embryo****704****Flour****705**

the earth for two or three months however they germinate. The very young seedling or tip of the root and young stem are eaten as a vegetable or pickled. The most valuable part is however the seed or rather embryo within the nut. This is removed by splitting open the nut and removing the large embryo which is often as much as an inch and a half in length. This is either eaten dry or after being roasted or cooked in various ways or it is reduced to a flour not unlike tapioca. This forms an important article of food in most parts of India where the palm is grown to any very considerable extent. The developed embryo is sweet in taste and is considered nourishing. It is sometimes preserved in sugar but in Bengal it is not an article of commerce. It is called *tal ati* (*phapal*) in Bengali. The tap root and young plants are not edible but are used in medicine as a stimulant. (*Babu T N Mukerji*)

In Ceylon they are known as *Kelingoe*. The nuts are collected and buried in heaps in the ground. When dug up after the space of three months the young shoots are called *kelingoes* they supply the inhabitants with a nourishing aliment. In size colour and shape they resemble a parsnip and look like a cold potato. In its fresh state it will keep good for a couple of months and when well dried in the sun for a whole year. In this state they are called *odials*. When reduced to flour or meal the favourite *cool* or gruel is made of it. (*Tropical Agriculture Simmonds 267*)

According to **Balfour Drury &c** the root is stated to be used as an article of food and to afford a kind of tapioca. I have not been able to have this statement confirmed and suspect that the germinating seedling is what is meant. The young leaf bud or cabbage as with most other palms may be eaten but the tree would be killed were this practice followed. It is thus scarcely correct to enumerate this amongst the properties of the plant.

Root
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Cabbage
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TIMBER

TIMBER
708

Structure of the Wood—The outer shell of hard wood consists of an almost solid mass of thick fibro-vascular bundles more scattered in the male than in the female trees. The centre is soft but only rarely hollow. **Brandis** says Forked and branching stems are occasionally found.

The outer hard woody shell is the part used as timber. The trees after being felled are cut lengthwise into two the soft fibrous part removed and the hard outer portion adapted to the purpose for which it is intended. From the structure of the fibres it splits easily but is stated to support a greater cross strain than any other known wood. Iron nails however rapidly decay it so that except for posts, it is not generally serviceable for house building. The hollowed out halves are used as water pipes gutters or open water-channels. They are made into dug out canoes. The swollen rounded and lower end forms the front of the canoe and the tapering end has either a piece of the original wood 6 inches in length or a lump of mud placed in it to close the mouth. The rounded end from which the mass of rootlets spring requires no protection for it is nearly as hard as the outer shell of the stem proper. The timber is used for posts rafters and a number of minor purposes. It is in fact the timber most used of all the Palm family for house building and other domestic purposes. A small export trade is done in the wood for making walking-sticks umbrella handles rulers and other small and ornamental purposes. In India it is often made into shuttles.

A rule exists in many parts of India (an unwritten law) that for every palmyra palm that is felled another must be planted. This is a very fortunate arrangement, for it would be difficult to find a tree regarding the uses of which so much might be written. **Mr Vincent**, in his report of the

Shell
709
Inner part
710

Small articles
711

Sticks
712
Shuttles
713

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flabelliformis.**

forests of Ceylon says of it The Tamils throughout the Jaffna peninsula derive no small portion of their food from the palmyra products whilst a large number may be said to live on the tree entirely In spring they make jaggery (a kind of sugar) during the rest of the year they live on the money so earned and on *Punatto* and *Kelingoes*

DOMESTIC AND SACRED USES

It has already been stated that in a Tamil poem 800 articles are described as prepared from the palmyra palm a large number of these are minor domestic appliances which need not be enumerated in this work a few of the more important may however be mentioned —

Domestic — *The Leaves* — These are made into fans and large *punkhas* variously lacquered or painted and into baskets of many forms and designs both for domestic and ornamental purposes In Madras neat work baskets are made of palmyra leaf A single leaf is often held over the head as a kind of umbrella Strips of the leaf carefully cut smoothed and slowly dried in the sun and rubbed with oil were formerly used in place of paper for writing letters and books on and to this day are so used in Orissa and South India For this purpose a steel pen or style is employed During the operation of writing the leaf is held in the left hand and the letters are scratched upon the surface In order that the characters may be better seen ink made of lamp black or some other colouring substance and gum is rubbed over the surface On such slips all the letters and edicts of the Dutch Government used to be written and sent round open and unsealed When a single slip was not sufficient several were bound together by means of a hole made at one end and a thread on which they were strung If a book had to be made for the use of the Wihares or any other purpose they sought for broad and handsome slips of *talapat* leaves upon which they engraved the characters very elegantly and accurately with the addition of various figures delineated upon them by way of ornament All the slips had then two holes made in them and were strung upon an elegantly twisted silken cord and covered with two thin wooden boards By means of the cord the leaves are held even together and by being drawn out when required for use they are separated from each other at pleasure In the finer binding of these kind of books the boards are lacquered the edges of the leaves cut smooth and gilded and the title is written on the upper board the two cords are fastened by a knot or jewel secured at a little distance from the boards so as to prevent the book from falling to pieces but sufficiently distant to admit of the upper leaves being turned back while the lower ones are read The more elegant books are in general wrapped up in silk cloth and bound round by a riband in which the Burmese have the art to weave the title of the book The palmyra books are never much beyond 2 feet in length and 2 inches in breadth as the parchment like ribs between the little ribs will not admit of their increase in size (*Mr W Ferguson's account reprinted in Tropical Agriculture by Simmonds*)

In the road side schools of Bengal and most parts of India long strips of palmyra palm leaf constitute the note books and exercise-books used by the boys They are carried to and from school generally wrapped up in the little piece of matting upon which the pupil sits Instead of a style however they use a reed pen covering the strips of palm leaf all over with large black characters When the lesson or exercise is finished, these strips are taken to the nearest tank and washed clean again

It is almost impossible to enumerate all the purposes to which the palmyra is put suffice it to say that a very large number of the articles of domestic use are in the rural districts of India, constructed from some part

DOMESTIC

Fans

714

Punkhas

715

Baskets

716

Umbrellas.

717

Braid

718

Books

719

Paper

720

School books.

721

BORAX.

Caps.
722
Hats
723
Jugs
724
Plates
725
Water pails.
726
Baskets.
727
Toys
728
Mats
729
Cement.
730

Biborate of Sodium.

of this most useful palm Caps and rain hats, cups and rice jugs plates water pails water baskets cooly baskets baskets for storing grain oil press baskets betel nut baskets clothes baskets sieves books toys and other miscellaneous articles, mats punkhas screens fences and thatching are all frequently made of this substance to a greater extent of course in some districts than in others depending upon the prevalence of the palm.

The juice — Amongst a variety of purposes to which it is put is that of being mixed with the white of eggs and with lime from burnt coral or shells. The result is a tenacious mortar capable of receiving so beautiful a polish that it can with difficulty be distinguished from the finest white marble (*Tropical Agriculture Simmonds 266*)

SACRED USES — The palmyra palm is one of the trees looked upon by the Hindus with veneration. It is accordingly planted for the public good the following being the trees the planting of which secures the kingdom of heaven 1 Pipal 2 Champaka 3 Nagakesara 7 Tál and 12 Narikela. According to some authors it is the *Kalpa* or *Ilpa* the *Kalpádrum* *Kalpákatáru* or *Kalpávríksha* of the Vedic writings being regarded as the symbol of vegetation of universal life and of immortality. It is also by some authors viewed as the sacred tree of Buddha. It is frequently seen on Buddhistic sculptures.

The existence of the names which are now applied to this palm in the Sanskrit writings is no absolute proof that the modern usage or adaptation of these names is correct. Botanical evidence is entirely opposed to the *tál* palm being a native of India the tree having been introduced from Africa. Moreover this palm does not grow so far to the north as the Panjáb even in the present day so that the names which are found in the Vedic writings of a date prior to the invasion of Northern India in all probability refer to a totally different plant. This is the more probable when it is recollected that *Nannorhops Rutchiana*, *Wendl* a palm which in its fan shaped leaves and in other respects resembles the palmyra is a native of the Trans Indus mountains of Western Sind and of the Salt Range passing to Beluchistan Afghanistan and Persia. Although rarely more than 20 to 25 feet in height the uses to which this palm is put and the fact of its luxuriating over low arid mountain tracts where few trees of any description are found might naturally have combined to assign to it a high place in the esteem of the Vedic poets. But without hazarding any very definite opinion as to what may have been the *Kalpa* tree of the ancients there seems very little doubt as to the Palmyra palm having been introduced into India long after the Vedic invasion.

BORAX

731

This is the Borate of Sodium or rather Biborate of Sodium $\text{Na}_2\text{B}_4\text{O}_{10}\cdot 10\text{H}_2\text{O}$ BORAX or BORATE DE SOUDE Fr BORAX BORSAURES NATRON Germ BORACE It BORAX Sp

Vern.—*Sohagá tinkál* HIND *Sohaga* or *suhágá* BENG *Sohagah*, *DUK Kuddia khár tankan khár* GUJ *Vengáram puskara* SINGH *Lakhiya lethiya* BURM *Venkaram* or *vengáram* TAM *Velligáram elegáram* TEL *Ponkáram vellakáram* MAL *Biligárd* KAN *Tan-kana* SANS *Burakes-sághah* or *burug es-sághah bórag*, *milhus-sághah* ARAB *Tinkár tankor* PERS *Sohága tinkár* or *tinkál tsalé* (one variety being *chu tsalé* or water of borax and the other *tsalé mentog* or flower borax *Baden Powell Pb Prod I 94*) PB *Vavut* KASHMIR *Sal shal chu sal* THIBETAN (Dr *Altchison* adds that it is called *sal* when collected from the soil and *ché sal* when from water)

The word Borax is of Arabic origin and Tincal (which by *Balfour* and most other authors is given as an old English name for Borax) is a Europeanised corruption of the Thibetan name *Tschuchal* (*chu sal*)

B 731

History of Borax.

BORAX.

or of the Persian *Tankár* and the Sanskrit *Tankana* indeed the word *Tinkál* is of common use on the Panjáb frontier *Tanna khar* TURKI *Pang sha* and *Yueh shíp* CHINESE It would seem probable that the article was first consigned to Europe from South India and with it the name *Tinkál*

§ *برق* *Burak* properly means that which is put in dough to make it inflated and shining—*Papri lon* or *Papri khan*—i.e. Carbonate of Soda and Potash *Burak es sághah* is Borax because it polishes silver There are also other kinds of *Burak* *Tankar* is a Persian word and means Borax it is probably derived from the same source as the Sanskrit *Tankana* The Persians also call Borax *Bureh* (Surgeon Major W Dymock *Bombay*)

HISTORY OF BORAX

The word Borax as stated above has come commercially to mean Borate of Soda but various other borates are met with in trade and Boracic acid itself has come into use as a source of borax or as a substitute for it hence the word Borax should be employed with some caution

(a) Borax proper is a native borate of sodium found along with common salt on the shores of certain lakes in the Panjab frontier of Thibet and in Thibet itself It is probably also met with in Persia and on the China Thibetan frontier Outside this limit it is found in California in Peru and in Ceylon

(b) One of the most important sources is the artificially prepared borax from the Lagoons of Monte Cerboli in Tuscany From the volcanic fissures of that region hot aqueous vapour is emitted This is collected in artificial basins called lagoons In course of time the water condensing in these basins is found to be charged with boracic acid This is removed by crystallization and by the action of carbonate of soda is in solution converted into Borax The discovery of this process of making artificial borax is due to **Cartier** and **Payen** and it is regularly practised in France

In England the Italian boracic acid is neutralised by mixing the dry acid with soda ash and exposing the mixture to the heat of a reverberatory furnace By this latter process ammonia is liberated and collected as a by product

(c) The borates of lime or double borates of lime and soda These occur in immense reniform blocks and are generally associated with gypsum and common salt They are almost completely soluble in acids

(d) Borate of magnesia is also a convenient source of boracic acid containing about 70 per cent when pure This is found generally in nodules associated with gypsum and potash salts

The supply of boracic acid being a monopoly in the hands of Count Lardarel some years ago (1855) an effort was made to open up the Indian trade in native borax An address was submitted to Lord Dalhousie in which it was pointed out that the imports into England of Italian boracic acid were at that time 1 100 tons and only 300 to 600 tons of Indian borax An enquiry was accordingly instituted which resulted in some interesting facts regarding the Ladak borax having been brought to light but down to the present date no appreciable development of the trade seems to have taken place In *Cunningham's Ladak* (pp 239-40) occurs an account of the Pugá borax and sulphur mines **Captain W O Hay** visited the Pugá valley and the following passages may be reprinted from his report It is a small valley which may roughly be calculated at two miles in length, and three quarters of a mile in breadth (i.e. the portion from whence the *sohágá* or *tincal* is collected) it extends east and west and has a fine stream running through it into the River Indus, but the portion producing the borate of soda is if not

NATIVE
BORAX
732

ARTIFICIAL
BORAX
733

PANJAB
BORAX.
Puga.
734

BORAX.

Natural and Artificial

PUNJAB
BORAX.

watered by still under the influence of, thermal springs varying in four places where I took the temperature from 130 140 150 to 167 degrees — the temperature of the streams into which these empty being in July 56 degrees

I ascertained as nearly as I could that the entire produce of the valley might be roughly calculated at 20 000 *kutch* maunds (a *kutch* maund is equal to about 32 lbs) the greater portion of which found its way to Rampur in Bishahr some to Kulu *via* Mandi to the lower hills and a small quantity *via* Chamba to Nurpur Nearly all that going *via* Rampur is taken into the lower hills in the neighbourhood of Sabathu Bhaji &c where wood is procurable and where during winter it is refined by the carriers who go there to graze their flocks It thus becomes borax in which state it nearly all finds its way to Jagadri* in the plains and thence I presume goes down the River Jumna or Ganges It is probable that little if any finds its way to England

Puga is not however the only place where the *sohad* is produced there is another locality near Rodok yielding it from which the route to the plains is *via* the Nite Pass This borax is said to be of a very superior quality nearly pure and requiring little or no cleaning but it is produced from a portion of Thibet in Changthán subject to China Doubtless other localities exist if the jealousy of the factors could be overcome and enable us to explore Nearly all the Trans Himálaya lakes seem to contain salts of various descriptions well worthy of chemical analysis to this I shall advert in a future paragraph

The transport of this tincal is almost entirely effected on goats and sheep being the animals at present best adapted to the mountainous path ways The trade being to a certain extent precarious the profits the merchants demand to protect themselves from loss would at a first view appear large when however the severity of the climate which they have to encounter and the losses from snow falling over precipices &c are taken into consideration it is not so exorbitant

The price of three sheep loads at Puga I have stated to be one rupee the average journey of a laden sheep being about a *kos* per diem it takes nearly one month to reach Kulu from Puga where the same sells for eight rupees and if cleaned as borax it sells at Sultánpur (Kulu) at five rupees the *kutch* or *kachcha* maund and if taken to the lower hills at Kudli Sisova and Teki at six rupees the *kutch* maund. After it is purchased by the Jagadri merchants I cannot say what expenses attend it but the difficulties are over and the prices here quoted clearly show the immense risk that is run on the first month's journey compared to the second from Sultánpur to the lower hills which occupies upwards of a fortnight and sometimes a month as the sheep get out of condition and are soon tired after the long journey

At present the people depend entirely upon falls of snow as rain never falls in those regions and they suppose that snow is necessary to produce the *sohada* which probably might be equally well produced by flooding The time I am informed required for its reproduction is only ten or twelve days but the sun in July and August is so very powerful that probably a succession of evaporations might be caused this would form ground for a chemical report

Davies, in his *Report on the Trade and Resources* of the countries on the north western boundary of British India says that "Borax goes to Kashmir, but in larger quantities to Rámpur, and from thence to Kur rachee

Kashmir and
Rampur
735

* At Jagadri the process of refining is extensively carried on

from the Pugá Valley

BORAX.

Lord Hay then Deputy Commissioner of Simla, in a report upon the Panjab Borax says The people who are engaged in the *sohaga* trade are chiefly Kanawaris and Khampos (a class of wandering traders) of Lahoul Thibet and Spiti In the summer months they resort to the Pugá mines and other places to which the *sohaga* found in Iartary is brought and return in the autumn before the passes are closed to the lower hills where they remain during the winter pasturing their flocks refining their *sohaga* effecting sales of it to the Simla merchants and making purchases of miscellaneous goods to take back with them in the ensuing summer

Simla.
736

The refining process is exceedingly simple and consists of dissolving the crude borax in two parts of hot or ten parts of cold water and then allowing it to crystallize Formerly it was the custom to cover over the crude borax with *ghí* to prevent efflorescence this practice has been I believe discontinued of late years *

To Rampur and Sultánpur about 2 500 maunds or 90 tons are annually brought Last year it sold at Simla for nine rupees a maund or £25 a ton and at Jagádrí it is now selling for twelve rupees or £37 a ton

Jagádrí.
737

The trade of borax with Kulu is almos entirely confined to the merchants of Jagádrí

In a letter from **Mr Edgeworth** to the Secretary to the Chief Commissioner Panjáb (*Feb 1854*) occurs the following interesting information From Jagádrí to Furruckabad it is taken on hackeries 25 maunds on each for hire of which Rs50 are paid and from thence by water the price of boat hire varying considerably These statistics however would be a guide to any European merchant wishing to engage in the trade

To give an idea of the increase in the borax trade with India during the last few years it is only necessary to mention that while in the year 1846-47 when the price was Rs9 a maund only 1 731 maunds were exported from Calcutta during the last six months of 1854 the large amount of 10 896 maunds at Rs22 per maund have been shipped for Europe

[The above extracts from **Captain Hays** report from **Lord Hay's** report and from **Mr Edgeworth's** letter are reprinted from **Mr Baden Powell's Panjab Products** (Vol I pp 90 to 95)]

Mr Atkinson in his *Economic Minerals of the North Western Provinces* gives some interesting information regarding borax from which the following note regarding the purification of the substance will be found useful The borax is pounded and placed in shallow tubes and then covered with water to the extent of a few inches to this is added a solution of about two pounds of lime dissolved in two parts of water for every ten maunds (820 pounds) of borax and the whole mass is well stirred every six hours Next day it is drained on sieves or cloth and after this is again dissolved in $2\frac{1}{2}$ times its weight of boiling water and about sixteen pounds of lime added for the above quantity It is then filtered evaporation takes place and subsequently it is crystallized in funnel shaped vessels usually of *kansa* an alloy of copper and zinc or lead The loss in weight is about 20 per cent (p 34)

In a report published in 1877 by the Secretary to the Government of the North Western Provinces and Oudh will be found some interesting information regarding the Thibetan trade in Borax The Secretary goes into the subject of the amount of uncleaned borax brought into Barmdeo

N W P
BORAX.
738

Barmdeo.
739

* Dr Dymock of Bombay informs me that this practice is not discontinued, and that the Hakims prefer it it reaches Bombay by way of Kurrachi

BORAX.**Panjáb Trade**

Chauki.
740
Reg
741
Kunj
742
Khand
743
Refuse
744

with the view of ascertaining whether it was possible to educate the Bhotias to select and clean their borax before carrying it across the frontier. By a process of sifting the borax is referred to two classes,—*chauki* or large crystals of borax and *reg* or borax dust. The former is so pure that it requires no further cleansing but the latter has to be boiled once or twice in order to separate the dirt. The result shows that of 100 maunds of the article as imported into the North West Provinces 60 maunds of *chauki* are separate and the 40 maunds of *reg* become reduced by first boiling to 10 maunds of *kunj* and 30 of *kandi* the latter by further boiling yields 5 maunds more of the purified borax or *kunj* and 25 maunds of dirt so that of 100 maunds of the article as imported 25 maunds are rejected as dirt. It seemed absurd that these 25 maunds should be carried across the frontier when the borax might easily enough be purified in Tibet. The sifting at least could be effected but the boiling might from difficulty in fuel be impossible. It was found however that there were other difficulties connected with the system of monopoly the Bhotias who carry it across the Himálayas do not bring it from the borax fields.

The region of Indian borax may be said to commence in the west at the valley of Pugá in Ladak passing east to the lakes of Rudokh. Along this tract of country and extending considerably to the east a chain of salt lakes occurs most of which in all probability afford borax. To the south of Lhasa at the Yamdok Cho borax is known to have been collected from time immemorial. Holes are dug in the arid soil of many parts of the deserts of Tartary wherein tincal collects and is periodically gathered.

TRADE IN BORAX**745**

Borax is chiefly imported into India through the North West and the Panjab Himálaya. The following statement shows the principal imports —

From Thibet into the North West Provinces

| YEARS | Weight in Maunds | Value in Rupees | |
|---------|------------------|-----------------|--|
| 1882-83 | 21 527 | 1 72 216 | |
| 1883-84 | 33 856 | 3 37 938 | |

From Ladak and Thibet into the Panjáb

| YEARS | Weight in Maunds | Value in Rupees | |
|---------|------------------|--------------------|-----------------|
| 1882-83 | { 9 179 2 588 | { 63 896 15 528 | Ladak Thibet |
| TOTAL | 11 767 | 79 424 | |
| 1883-84 | { 9 088 3 33 | { 73,081 20 028 | Ladak Thibet |
| TOTAL | 12 426 | 93 109 | |

B 745

brought into N-W Provinces

BORAX.

TRADE
STATISTICS

Thus it would appear that the total imports into India across the frontier in 1883 84 amounted to 46 282 maunds (=33 058 cwt) valued at ₹431 047. The foreign exports of that year were 16 216 cwt valued at ₹3 58 518 showing that whereas only 16 216 were exported there were consumed in the country 16 842 cwt. During the year there were also imported from foreign countries 38 cwt valued at ₹1 493. These figures give some idea of the importance of borax as an article of internal trade and they show at the same time its enhanced value from its entrance into India until it is exported to foreign countries.

§ Three kinds of Borax are met with in the Bombay market—*vis* European Cawnpore (Thibetan) and Kurrachi (Teliya Tankankar). The European can often be purchased at the same price as the impure Thibetan as it is imported in casks. The Thibetan occurs in circular cakes thin at the edges as if crystallized in a basin. The Teliya Tankankar is in thin flaky crystals with a greasy surface. (*Surgeon Major W Dymock Bombay*)

For the past few years the exports have been steadily decreasing—a natural consequence of the discovery of extensive beds of borax in America and of the greatly extended trade in the artificially prepared article. Indeed India cannot hope to compete in the foreign trade in borax but the internal consumption which is very considerable will always make the trans frontier imports of importance. It is noteworthy that while the external trade has been falling off year by year the internal trade seems to have correspondingly increased.

The following analysis of the exports to foreign countries for the past year shows the province from which imported and the country to which exported —

Analysis of the Trade in Borax for 1883 84

| Presidency from which exported | Weight in Cwt | Value in Rupees | Country to which exported | Weight in Cwt | Value in Rupees |
|--------------------------------|---------------|-----------------|---------------------------|---------------|-----------------|
| Bengal | 16 095 | 3 54 699 | United Kingdom | 14 134 | 2 92 585 |
| Bombay | 121 | 3 819 | Arabia | 38 | 1 130 |
| | | | China—Hongkong | 1 713 | 56 424 |
| | | | Straits Settlements | 258 | 6 147 |
| | | | Turkey in Asia | 36 | 1 057 |
| | | | Other countries | 37 | 1 175 |
| TOTAL | 16 16 | 3 58 518 | TOTAL | 16 216 | 3 58 518 |

PROPERTIES AND TESTS FOR BORAX—A salt occurring in colourless transparent shining monoclinic prisms odourless slightly efflorescent having a cooling sweet taste with an alkaline reaction. It is a detergent to the mouth clearing the throat. It has the composition $\text{Na}_2\text{B}_4\text{O}_7$ with 10 molecules of water of crystallization. This is what is called prismatic borax but if crystallized at 79° it forms octohedra having only 5 molecules of water. When a solution of borax is evaporated at 100° C the salt is left as a transparent amorphous brittle mass containing only four molecules of water. When heated a dry powder of borax begins to lose its water then melts on further heating it swells up forming a porous mass and at a red heat fuses forming a colourless glass from which water of crystallization has been completely expelled. This forms the borax

BORAX.**Properties Tests, and Uses of Borax.**

beads now so extensively used in chemical analysis If touched with a metallic salt the borax bead will in the reducing flame of the blow pipe, become coloured *red* with sub oxide of copper *green* with ferrous oxide &c and in the oxidizing flame *red* with ferric oxide *violet* with manganese salts, *blue* with cobalt oxide &c These beautiful reactions form convenient tests for the metallic salts

Borax itself may be readily detected by a number of delicate tests. An aqueous solution on the addition of sulphuric acid should deposit shining crystalline scales which will be found to impart a brilliant green colour to the flame of a spirit lamp This convenient test will establish the presence of the merest trace of borax The chief adulterants are phosphate of sodium and alum The former may be readily detected by the fact that it will quickly effloresce in the heat of a drying room and the latter by the brilliant cobalt blue produced before the blow pipe when a piece of alum is touched with a solution of cobalt chloride

Borax has the property of rendering cream of tartar soluble but for this purpose boracic acid may be substituted for borax One of the most curious properties of borax has recently attracted much attention—namely its power of destroying fermentation *Schnetzler (Pharm Journ 3rd Series V 846 abstracted into the Year Book of Pharm 1875)* demonstrated the action of this substance upon the protoplasm of vegetable cells and proved beyond doubt that the yeast plant is rapidly destroyed fermentation being therefore impossible in the presence of borax He further showed that in consequence of this fact both animal and vegetable matter might be preserved for years without undergoing putrefaction This fact justifies the theory of the value of borax as an antiseptic lotion

THE USES OF BORAX

Dye.—It is used as a mordant in dyeing especially in calico-printing along with turmeric

Medicine — Borax was known to the ancient Hindus from a very remote period and is mentioned by *Susruta*. It is viewed by the native doctors as a tonic and is regarded as useful in loss of appetite painful dyspepsia cough asthma &c (*U C Dutt*) As an antiseptic lotion and as a stimulating wash for hot eruptions on the body and scaly skin diseases borax may be said to be an established remedy It exerts a peculiar detergent action on the mucous membrane it is accordingly regarded as a useful drug in aphthous and other ulcerations of the mouth and in pruritus not only of the external body but also of the urethra and vagina Internally it is very little used by European physicians but has been prescribed in dropsical affections and epilepsy It is supposed to possess a powerful influence over the uterus promoting menstruation and facilitating parturition it has also been used in dysmenorrhœa and as an astringent in uterine hæmorrhage it has been used with alleged benefit

Special Opinions.—§ Used as a detergent in various affections of the skin also as an ingredient of spleen powders (*Brigade Surgeon S M Shircore Moorshedabad*) It is used as a germicide in thrush and ring worm, but not so efficacious as boracic acid' (*Brigade Surgeon G A Watson Allahabad*) Bazar borax used in hospital practice, in the form of ointment, in psoriasis and eczema and as a lotion in pruritus and herpes circinatus Dissolved in acetic acid it forms the common solution used for ringworm It is found very useful in allaying the irritation of prurigo and erythema (*Assistant Surgeon Fawant Rai Mooltan*) "Efficacious application and gargle for aphthous sores" (*Assistant Surgeon Shib Chunder Bhattacharji, Chanda, Central Provinces*) "Use-

DYE
747
MEDICINE
748

Frankincense.

BOSWELLIA

ful as a local application in aphthæ sore nipples ulcers ringworm &c (*Brigade Surgeon F H Thornton B A M B Monghyr*) "Borax is considered by the Hakims a powerful promoter of digestion if taken in 10 to 15 grain doses about an hour after meals with a little water (*Assistant Surgeon Mokund Lall Agra*) A handful or so to the bath relieves lichen tropicus (*Surgeon Major G Y Hunter Karachi*) Useful with honey in thrush (*Surgeon Major C R G Parker Pallaveram Madras*) I constantly use this for sore mouth in conjunction with glycerine as a gargle (*Surgeon Major H D Cook Calicut Malabar*)

Burnt borax is used in dyspepsia attended with acidity—dose 10 grains (*Surgeon Major E C Bensley Rajshahye*) It is also found to be of use in parasitic skin diseases especially the ringworm or eczema caused by the parasite called *chambal* (*Assistant Surgeon Bhugwan Dass Rawal Pindi Panjab*) A very useful hæmostatic in menorrhagia a good lotion in thrush and ringworm and pruriginous eruptions (*Brigade Surgeon W R Rice M D Jubbulpore*) Mixed with other substances as bark charcoal &c as a dentrifice acts in whitening the teeth (*Honorary Surgeon P Kinsley Chicacole, Ganjam Madras*)

Industrial Uses—They most important use of this substance is unquestionably in the glazing of all descriptions of pottery and china ware as well as for enamelling clock and watch faces iron plates &c' (*Spons Encycl*) It is also largely used in the process of soldering oxidizable metals its action being to clean the surfaces by fusing away the oxides into a borax bead It is extensively used by Indian goldsmiths and in the manufacture of artificial gems It is also along with shell lac made into a useful varnish The dentist finds it valuable in making plates for artificial teeth Plumbago and other pots are found to last much longer if painted with borax For household purposes its uses are practically unlimited it being in some respects superior to soda As a substitute for or addition to soap it cleanses fabrics without injuring the colours

Borax is sold in every Indian bazar and appears to be used for a variety of purposes which have not been carefully investigated and made public

749

BOSWELLIA, Roxb Gen Pl, I 322

A genus of balsamiferous trees belonging to the Natural Order BURSERACEÆ there are in all about six species natives of India and tropical Africa—one species with two distinct varieties being plentiful at the foot of the Western Himalaya Central India Rājputana, the Deccan the Circars and the Konkan

Bark frequently papyraceous *Leaves* alternate exstipulate imparipinnate deciduous with opposite sessile usually serrate leaflets *Flowers* small white hermaphrodite in axillary racemes or panicles *Calyx* small 5 toothed persistent *Petals* 5 distinct narrowed at the base imbricate *Disk* annular crenate *Stamens* 10, 5 long 5 short inserted at the base of the disk *Ovary* sessile 3 celled style short stigma 3 lobed ovules 2 in each cell pendulous *Drupe* trigonous containing 3 1-seeded pyrenes which finally separate *Seeds* compressed pendulous

The genus is named in honour of Dr John Boswell of Edinburgh

Boswellia (Species not satisfactorily determined)

THE TRUE FRANKINCENSE OR OLIBANUM of European commerce

Vern—*Kundur lubān thus* ARAB, PERS, HIND *Kunduru* SANS *Viśesh esesh*, BOMB *Parangi shāmbirāni kunurakkam-pishin* TAM *Parangi-sambrani* TEL

Gum—It is probable that several species yield Olibanum, of which *B Carterii* is perhaps one of the most important They are trees inhabiting the Somali coast of Africa to Cape Guardafui and also the south coast of Arabia.

750

751

GUM
752
Olibanum
753

B 753

BOSWELLIA

Frankincense

The Arabs as early as the tenth century carried Olibanum to India, and the Indian names for it have through the lapse of time become almost hopelessly mixed up with those given to the Indian species of this genus and also with those given to the Balsamodendrons. It is impossible therefore to fix definitely the names of the balsamiferous plants Mohammedan writers distinguish several kinds of the imported or African and Arabian Olibanum —

1st — *Kundur Zakar* or male Frankincense. This is esteemed the best quality and consists of deep yellow tears. It should burn readily and not emit much smoke.

2nd — *Kundur Unsa* or female Frankincense.

3rd — *Kundur Madharaj*. This consists of artificially prepared tears made by shaking the moist exudation in a basket.

4th — *Kishar* or *qishar Kundur* or *Kashfa*. This consists of the bark of the tree coated with the exudation. This is the *Dhup* of the Bombay market and under that name forms a distinct article of commerce.

5th — *Dukak* or *daqaq Kundur* or dust of Olibanum. This meets the demand of the Indian and Chinese markets the finer qualities of Olibanum being exported from Bombay after assortment to Europe (*Surgeon Major Dymock*).

The *Pharmacographia* gives an enumeration of the plants supposed to yield Olibanum or gum resins which have been or may be mistaken for that substance of which the following may be given as an abstract —

I — **B Carterii Birdw** — This includes three forms —

(a) *Meddu* or *Mohr madow* yielding the *Luban bedowi* or *Luban sheheri* of **Playfair**. **Hildebrandt** describes this as a tree indigenous to the limestone range of Ahl or Serrutin the northern part of the Somali country. This is the plant represented by **Bentley** and **Trimen** in their *Medicinal Plants* figure 58.

(b) A form sent by **Playfair** along with the preceding having almost entire leaflets velvety below glabrous above.

Maghrayt d sheehas of the Maharas.

II — **B Bhau Dajiana, Birdw** — Very nearly allied to if indeed specifically distinct from **B Carterii**.

III — A species which yields *Luban bedowi*. It is a native of Bunder Murayah Somali country never found on the hills close to the sea but further inland and on the highest ground.

IV — **B neglecta S Le M Moore**. The vernacular name of this tree is given as *Murlo* or *Mohr add*.

V — **B Frereana Birdw** — This is a well marked species known to the natives as *Yegaar*. It yields the fragrant resin sold as *Luban Meyeti* or *Luban mati*. This the authors of the *Pharmacographia* regard as most probably the substance originally known as *Elemi*. *Luban mati* differs from the samples of true Olibanum in not containing gum it may be described as composed of resin and an essential oil (*Flückiger in Pharm Journal 3rd Series VIII 805*). **Dr Dymock** says this is sold in Bombay as *Pándhri Eshesh*. It is the plant which yields the stalactitic Olibanum a substance which differs chiefly from the other forms in the absence of soluble gum.

VI — **B papyrifera Endl Richard (?)**. This is the *makur* of Sennaar and the mountainous regions on the Abyssinian rivers Takazze and Mareb ascending to 4 000 feet above the level of the sea. It appears not to grow in the outer parts of North Eastern Africa. While this yields a resin there is not the slightest reason for attributing any commercial Olibanum to it. It is probably more nearly allied to *Luban mati* than to Olibanum.

Kundur

Zakar

754

Kundur Unsa

755

Kundur

Madharaj

756

Kashfa

757

Dukak

Kundur

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759

760

761

762

763

764

Olibanum.

BOSWELLIA

VII—**B serrata**, Roxb (see page 515)

HISTORY OF OLIBANUM

This substance being an essential ingredient in incense has been known from extreme antiquity. Many centuries before Christ the drug was one of the most important articles of trade which the Phœnicians and Egyptians carried on with Arabia. Frankincense is mentioned by **Herodotus** (*B C 484*) and by **Theophrastus** (*B C 394 287*) as an article produced in the country of the Sabæans (the south shores of Arabia?) where it was found in 1844 46 by **Oarter**. The Arabs seem to have procured it from the ancient Sabæans and it is an interesting fact that they took it into China amongst other articles as early as the tenth century and that this trade has existed down to the present date. The Arabs also brought it to India where it was known to the Sanskrit writers under the name *Kundura* a word derived from the Arabic and Persian name *Kundur*. **Diodorus** (*B C 50*) refers to frankincense as one of the products of the rich country owned by the Araos. **Strabo** (*B C 54 to A D 24*) mentions frankincense and balsam as met with in the country of the Sabæans and **Pliny** (*A D 23 79*) says there is no country which bringeth forth frankincense but Arabia. **Arrian** (*A D 90*) describes Makulla as the coast of the country of frankincense. **Ptolemy Dioscorides, Marco Polo Garcia de Orta Oeissus Linnæus** and many others mention this gum resin (*Birdwood Bomb Prod Fluck & Hanb Pharmacographia Dymock Mat Med and U C Dutt Mat Med of the Hindus &c*).

HISTORY
765

MEDICINE

Description of Olibanum—Olibanum as met with in European commerce may be described as a dry gum resin consisting of tears often an inch in length and of an ovate or oblong clavate or stalactitic form and mixed with impurities. The pieces are light yellow to brown or pale green or colourless. The odour is balsamic and resinous especially while being burned. In taste it is bitter and terebinthinous dissolving in the mouth. By heat it softens without actually fusing decomposing at high temperatures.

MEDICINE
Olibanum
766

Olibanum is considered by the Mohammedans to be hot and dry and to have dessicative astringent and detergent properties. It is used internally and externally in much the same way as we use the products of the Pines and Iirs. Recently olibanum has been made officinal in the *Pharmacopœia of India* where it is recommended in chronic pulmonary affections such as bronchorrhœa and chronic laryngitis employed both internally and in the form of fumigation. In the same work an ointment has been introduced which is said to be a good stimulant application to carbuncles ulcerations boils &c. I have found that a good imitation of commercial Burgundy Pitch may be made by incorporating melted olibanum with water in a steam bath a sufficiently good quality for this purpose can be purchased for ₹12 per cwt (*Surgeon Major W Dymock Bombay*).

Chemical Composition—The following extract from the *Pharmacographia* will be found to contain all that is known of the chemistry of this substance. Cold water quickly changes olibanum into a soft whitish pulp which when rubbed down into a mortar forms an emulsion. Immersed in spirit of wine a tear of olibanum is not altered much in form but it becomes of an almost pure opaque white. In the first case the water dissolves the gum while in the second the alcohol removes the resin. We find that pure olibanum treated with spirit of wine leaves 27 to 35 of

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BOSWELLIA.

Frankincense

gum * which forms a thick mucilage with three parts of water. Dissolved in 5 parts of water it yields a neutral solution which is precipitated by perchloride of iron as well as by silicate of sodium but not by neutral acetate of lead. It is consequently a gum of the same class as gum arabic if not identical with it. Its solution contains the same amount of lime as gum arabic affords.

The resin of olibanum has been examined by Hlasiwetz (1867) according to whom it is a uniform substance having the composition $C^{20}H^{30}O^8$. We find that it is not soluble in alkalis nor have we succeeded in converting it into a crystalline body by the action of dilute alcohol. It is not uniformly distributed throughout the tears if they are broken after having been acted upon by dilute alcohol it now and then happens that a clear stratification is perceptible showing a concentric arrangement.

Olibanum contains an essential oil of which Braconnot (1808) obtained 5 per cent. Stenhouse (1840) 4 per cent. and Kurbatow (1871, 1874) 7 per cent. According to Stenhouse it has a sp. gr. of 0.866 a boiling point of $179.4^\circ C$ and an odour resembling that of turpentine but more agreeable. Kurbatow separated this oil into two portions the one of which has the formula $C^{10}H^{16}$ boils at $158^\circ C$ and combines with HCl to form crystals the other contains oxygen. The bitter principle of olibanum forms an amorphous brown mass.

The resin of olibanum submitted to destructive distillation affords no umbelliferone. Heated with strong nitric acid it develops no peculiar colour but at length camphoretic acid (see Camphor) is formed which may be also obtained from many resins and essential oils if submitted to the same oxidizing agent. (*Pharmacographia Fluck and Hanb pp 138 139*)

TRADE IN OLIBANUM

Bombay is the centre of the Olibanum trade. The houses which deal in gum have agents in Arabia and Africa who buy it up and forward it here in a mixed condition. It passes through the Custom House as *Esesh* and is next sorted into four or five different qualities. The first consisting of all the large clean tears is destined for the European market. The intermediate qualities and the last which is only the dust and refuse supply the Indian and China requirements. The *Kishar Kundur* or *Kashfa* of the Arabs forms a distinct article of commerce under the Indian name of *Dhup*. The method of collecting Olibanum in Africa has been described by Oruttenden (*Trans. Bomb. Geograph. Soc. VII 1846 121*). Carter in the same publication has described the collection of the drug in Southern Arabia. In both localities a simple incision in the tumid bark is made and the product collected as soon as it becomes sufficiently hard. The collection is carried on from March to September in Africa and from May to December in Arabia.

Olibanum is shipped from Makulla Aden and other neighbouring ports to Bombay as already mentioned it is there sorted for the different markets. The trade is in the hands of Khojas and Bunnias. The price varies from Rs 4 per cwt for the dust to Rs 20 per cwt for the finest tears. Bombay exports from 25 000 to 30 000 cwt annually. Nearly four fifths of this quantity go to Europe, and the rest to China. (*Dymock Mat. Med., W. Ind. 122*)

It would appear that a certain amount of the Olibanum met with in commerce is exported direct from Egypt to Europe. This is the so

* I obtained 32.14 per cent from the finest tears of the kind called *Fasous bedowi* with which I was presented by Captain Hunter of Aden.—F. A. F.

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African
Olibanum
769
Indian
Olibanum
770

B 770

Indian Olibanum

**BOSWELLIA
serrata.**

called African Olibanum the term Indian Olibanum being in the trade applied to the same article which reaches Europe *via* India coming originally from the Red Sea ports to India and thereafter being re exported to Europe It seems a mistake to suppose that any of the Indian article is obtained from the indigenous Indian plant

Boswellia serrata, Roxb ex Colebr, in Asiat Res ix 379 t 5
Fl Br Ind, I 528 BURSERACEÆ

771

Sometimes called THE INDIAN OLIBANUM TREE

Syn—B THURIFERA Roxb ex Flem B GLABRA Roxb B THURIFERA Colebr (as in Gamble's Manual of Timbers) LIBANUS THURIFFRA Colebr

Vern—(The gum resin) *Salhe salai* or *salai salga sel gônd kundur salpe luban* HIND *Lubân salai kundro* BENG *Saleya* LOHAR DUGGA *Salga* SANTAL *Anduku anduga guggar dumsal*, KUMAON *Salla bor-salai ganga GOND Sildî or salai* (at NAGPUR) C P *Salar ULWAR Salai salga guggula salaya-dhup salaphali* BOMB *Salap hali* MAR *Kundur DUK Dhup mukul salai gugali* GUJ *Saliya gugul* CUTCH *Kungli gugulu kundrikam morada kundurukham pishin parangi shâmbi rani* TAM *Parang sombrini anduga-pisunu anduku andu* TEL *Vella kundurukham* MAL *Chittu KAN Salasi nryasa sallaki kunduru guggulu* SANS *Bastaj kundur luban* ARAB *Kundur* PERS *Thabi ben BURM Kundrikam* SINGH

It is probable that the name *Gugul* should have been restricted to this plant but modern use has extended it to include **Balsamodendron Mukul** There are two varieties both of which yield the gum resin incorrectly called Indian Olibanum —

Var 1st—serrata proper

Habitat—A moderate sized gregarious tree of the intermediate northern and southern dry zones Sub Himâlayan tract from the Sutlej to Nepal the drier forests of Central India from Berar to Rajputana and southward to the Deccan the Circars and the Konkan Frequent on the eastern slopes of the Pegu Yomah and Martaban Burma (*Kurs*)

Botanic Diagnosis—This is **B thurifera** Roxb and is characterised by the leaflets being sessile pubescent coarsely crenate serrate racemes axillary shorter than the leaves

Properties and Uses—

Gum resin—The gum resin *Salai gugul* occurs as a transparent golden yellow semi fluid substance which slowly hardens with lime **Moodeen Sheriff** says that when it is found in the soft massive form it is known as *Gandah ferozah* in tears (? true olibanum) it is known as *kundur* It is pungent having a slightly aromatic taste and balsamic resinous odour It becomes opaque when immersed in alcohol or in water the proportion of resin to gum being much smaller than in frank incense The opaque soft whitish mass produced by water when rubbed in a mortar forms an emulsion Indian Olibanum is consumed almost entirely in Central and Northern India and is never exported

In the Upper Godavari it yields plentifully the resin Olibanum (*C P Gazetteer 503*) A sweet scented gum burnt in religious ceremonies and sometimes used to strengthen lime in Rewa Kantha Gujarât (*Bombay Gazetteer VI 13*) A very common tree on all trappean hills conspicuous by its white and scaly bark No such substance as frankincense is extracted from it in Khândesh The gummy wood is however used for torches

Sir J D Hooker, in his *Himâlayan Journals (Vol I 29)* says that while travelling on the mountain tracts of Behar he came across a small forest of this tree near Belcuppé The gum was flowing abundantly from

GUM RESIN
Gandah
ferozah.
772
Kundur
773

**BOSWELLIA
serrata.****Salái Gugul, or Indian Olibanum**

the trunk very fragrant and transparent Dr Irvine in his *Topography of Ajmere* (p 135) says that the tree is very plentiful in the Ajmir hills The *gundabiroso* is the prepared gum resin and is similar in appearance and qualities to Venice turpentine It is brought from Mewar Harowtee and the Shekhawattee hills and is considered stimulating An oil is distilled from it said to cure gonorrhœa The gum resin is also made into ointment It is much used in painting especially by the *lakheries* men who paint with coloured lac (?)

Care must be taken not to confuse this gum resin with the Olibanum or Frankincense of commerce or with Mukul (see *Boswellia*, sp and *Balsamodendron Mukul*) The Sanskrit name *Kunduru* derived from the Arabic word *Kundur* is most probably wrongly applied to the gum resin of this species It should be restricted to frankincense a substance which reaches India from Arabia and Africa The true Sanskrit name for this plant is most probably *Sallaki* from which is derived the Hindi word *Salai* It would also appear that this is the *Guggulu* of Sanskrit writers which is described as moist viscid fragrant and of golden colour when freshly exuded Gum gugul of the present day is Indian *Bdelium (Balsamodendron Mukul)* (*Surgeon Major Dymock Mat Med W Ind 123*)

MEDICINE
Gum resin
774

Medicine — Very little of a definite nature is known of the medicinal virtues of this gum It is probable that all that has been written on the subject should be considered as applying exclusively to imported Olibanum Dr Dymock says that the *Guggulu* of the Sanskrits was regarded as a demulcent aperient alterative and a purifier of the blood The gum at the present day is used in rheumatism nervous diseases scrofulous affections urinary disorders and skin diseases and is generally combined with aromatics It is regarded as a diaphoretic and astringent and is used in the preparation of ointment for sores It is also prescribed with clarified butter in syphilitic diseases with cocoanut oil for sores and as a stimulant in pulmonary disease Mixed with gum acacia it is used as a corrective for foul breath taken for any length of time in 3i doses it is said to reduce obesity

Special Opinions — § The gum resin is used to promote the absorption of bubo and is applied locally The oil in 10 or 20 minim doses is useful in gonorrhœa taken in demulcent drinks (*Surgeon C M Russell Sarun Bengal*) Refrigerant diuretic emmenagogue and clolic doses 5 to 40 grains used in aphthæ placenta prema amenorrhœa dysmenorrhœa sore nipple gonorrhœa ringworm (*Choonna Lall Hospital Assistant Jubbulpore*) Astringent applied in the form of an ointment to chronic ulcers diseased bones buboes &c (*Surgeon W Barren Bhuj Cutch*)

Food — The flowers and seed nut are eaten by the Bhils (*Bombay Gaz XII 27*)

FOOD
Flowers and
Nuts
775
TIMBER
776

Structure of the Wood — Wood rough white when fresh cut darkening on exposure moderately hard It is not durable but it has been reported that five sleepers made of it and soaked for some time in a tank filled with the leaves of *Bahera (Terminalia belerica)* put down in June 1876 on the Holkar and Neemuch State Railway are still (1881) perfectly sound and good (*Indore Forest Report 1876 77* quoted in *Indian Agriculturist* of May 1878) The timber is recommended for tea boxes (*Indian Forester IX 377*)

It is used for fuel and for making charcoal which in Nimar is employed for iron smelting This is a common and though not very large a very beautiful tree (in Panch Maháls) Its narrow pointed leaflets and drooping branches give it something the look of the English garden acacia Its grey flakey bark is noticeable It yields a cheap resin, and

The Boucerosia

BOUCEROSIA
Aucheriana

besides for fuel its wood is used in making platters (Bombay Gasetteer III 199)

Var 2nd—*glabra*, sp, Roxb

Vern—Kundur HIND PERS ARAB Salhi PB Farangi ud kundur DUK Parangi shimbiran kunduruk m pishin TAM Guggi lapu chettu (tree) gugil anduga-pisunu parangi s mir ni TEL Mannakungil yam valanku ch i nbr ni MALA Bringulobin BURM

Habitat—A moderate sized tree of North West India Leaflets nearly or quite glabrous and generally entire or nearly so racemes terminal sub panicled

It seems probable that this form yields the solid rounded pieces or tears described by some authors as of Indian origin owing to its drying more rapidly than the gum resin from *B serrata* Royle describes picking tears off the trees and states that these burn rapidly with a bright light diffusing a pleasant odour

777

For further particulars regarding the Boswellias and Frankincense the reader is referred to *Dr Dymock's Materia Medica of Western India* (from which much of the above information has been obtained) to *Dr Birdwood's Monograph of the Genus Boswellia in the Linnaean Society's Transactions* LXXVII to *Olibanum in Fluckiger and Hanbury's Pharmacographia* (p 133 Ed 1879) *Bentley and Trimen's Medicinal Plants* 58 *Pharmacopæia of India* 52 *Royle's Illustrations of the Botany of the Himalaya* p 177 *Ainslie Vol I* p 176 *Moodeen Sheriff's Supplement to the Indian Pharmacopæia* *Spons Encyclopædia*

BOTRYCHIUM, Sw Syn Fil 447

A genus of ferns belonging to the sub-order OPHIOGLOSSACEÆ distinguished by having the fructification in a compound or raciform panicle forming a separate branch of the frond

778

Botrychium virginianum, Swartz Syn Fil 448 *Clarke's Ferns N Ind in Trans Lin Soc* 1880 p 588

779

Habitat—The Himálaya from Kumaon to Bhután the Khásia Hills very common at altitudes from 5 000 to 8 000 feet

Food—Sir J D Hooker in his *Himalayan Journals* says (Vol I 293) This large succulent fern grows plentifully at the Raklang Pass in Sikkim it is boiled and eaten both here and in New Zealand

FOOD
780

BOUCEROSIA, W & A Gen Pl II 782

781

Fleshy leafless herbs with thick 4 angled stems angles toothed *Flowers* terminal rather large solitary or umbelled more or less purple *Sepals* narrow *Corolla* campanulate or rotate lobes 5 short broad valvate *Corona* annular adnate to the column 5 lobed lobes 2 fid s bulate erect or spreading with a linear fleshy process on the inner face at the sinus inflexed over the anther *Column* minute short *anther tips* inappendiculate pollen masses one in each cell sessile erect suborbicular compressed *Stigma* low conical 5 angled tip truncate depressed *Follicles* slender straight terete smooth *Seeds* flat winged comose

Boucerosia Aucheriana, Dcne Fl Br Ind, IV 78 ASCLEPIADEÆ

782

Vern—Charungli chungri pawanne pamanke PB

Habitat—Found in the western part of the outer Himálaya in the Salt Range and Trans Indus ascending to 3 000 feet

B 782

BRAGANTIA.

The Bragantia.

MEDICINE

Stems.

783

Medicine—The juicy stems are considered stomachic carminative and tonic **Bellew** states that they are also used as vermifuge and **Masson** mentions that dried and powdered they are taken as stimulants

Boucerosia edulis, *Edge*, see **Caralluma edulis**, *Benth*

784

BOUEA, *Meissn Gen Pl I 420*

A genus of trees belonging to the Natural Order ANACARDIACEÆ contain ing some five species natives of tropical Asia and the Malay Archipelago

Leaves opposite petioled coriaceous glabrous quite entire *Flowers* small in axillary and terminal panicles polygamous *Sepals* 3 5 deciduous valvate *Petals* 3 5 imbricate *Disk* very small *Stamens* 3 5 inserted within the disk all fertile *Ovary* sessile style short terminal stigma obscurely unequally 3 lobed ovule ascending from the wall of the cavity *Drupe* fleshy stone thin fibrous 1-celled 1-seeded *Seed* sub-erect cotyledons fleshy radicle very short inferior

785

Bouea burmanica, *Griff Fl Br Ind, II 21*

Syn—**B** OPPOSITIFOLIA *Meissn Kurb 1 306* **MANGIFERA** OPPOSITIFOLIA *Roxb (Fl Ind Ed C B C 215)*

Vern—*Meriam mayan* or *mai een* **BURM**

Habitat—A moderate-sized evergreen tree met with in Burma and the Andaman Islands

Food—The tree has an edible fruit for which it is often cultivated

Structure of the Wood—Grey hard with a dark reddish brown heart wood Weight 55 lbs per cubic foot

It is not specially used but it is said by **Roxburgh** to be very durable

FOOD

786

TIMBER

787

788

BOWS AND ARROWS, Timbers used for

Acacia Catechu

Areca Catechu

Cephalostachyum capitatum.

Dendrocalamus strictus and other Bamboos

Dolichandrone stipulata.

Garcinia speciosa

Grewia oppositifolia

Grewia vestita

Lagerstroemia tomentosa

Parrotia Jacquemontiana,

Reeds, various species used for arrows

Shorea siamensis

Taxus baccata

Boxwood, see **Buxus**

789

BOXWOOD, Timbers used as substitutes for

Atalantia monophylla.

Crataeva religiosa.

Celastrus spinosus

Chloroxylon Swietenia.

Dodonaea viscosa

Gardenia gummifera

G latifolia.

Hemicyclia sepiaria

Homonoya symphyllæfolia

Ixora parviflora

Memecylon edule

Murraya exotica

Olea ferruginea

Psidium Guyava

Punica Granatum.

Santalum album

Sonneratia acida

Viburnum crubescens

Brachyramphus sonchifolius, *DC*, see **Lactuca remotiflora**, *DC*
COMPOSITEÆ

790

BRAGANTIA, *Lour Gen Pl, III, 122*

A genus of small bushes belonging to the Natural Order **ARISTOLOCH** IACEÆ and containing 3 species natives of India and the Malaya

Leaves alternate shortly petiolate 3 5 nerved, oblong lanceolate or obo

B 790

The Brassaiopsis.

BRASSAIOPSIS
speciosa.

vate *Flowers* forming a lax cymose-corymb or short racemose cyme *Pers anth* single bell shaped adnate to the ovary and articulated to the top *teeth* 3 equal deciduous *Stamens* 6-12 arranged in one series on a disk around the base of the style and slightly adherent to it *filaments* free or slightly united below often united by threes *Ovary* inferior 4 locular style short bearing 3 many stigmatic arms *ovules* many arranged on 2 series and pendulous *Fruit* somewhat like a silqua slender about 4 inches long terete *Seeds* oblong 3 angled

The wood of the stem is very peculiar differing in a remarkable degree from that of the ordinary exogens

Bragantia Wallichii, *R Br Wight Ic t 520, DC Prodr XV pt I 430*

Vern—*Alpam* MAL

Habitat—A small bush with decumbent branches met with in the southern half of the Bombay Presidency near the coast and in Madras and Ceylon

Medicine—The whole plant mixed with oil and reduced to an ointment is said to be very efficacious in the treatment of psora or inveterate ulcers Like other plants belonging to the same natural order it is supposed to have virtues in the cure of snake bites the juice of the leaves mixed with the *Vusumbu* (*Acorus Calamus*) root the root itself rubbed up with lime-juice and made into a poultice and externally applied are the chief modes of administering it among the natives (*Drury's Useful Plants* 86) This is regarded as one of the most powerful antidotes to poison known on the west coast A Malabar proverb says As soon as the *Alpam* root enters the body poison leaves it **B tomentosa** *Blume* a native of Japan according to *Horsfield*, is bitter and is regarded as an emmenagogue (Compare with *Pharm of India* p 99 *Drury's Useful Plants Fra Bartolome's Voyage to the East Indies* p 416)

Bran—A coarse product of wheat separated from the latter in the milling process See *Triticum sativum*.

BRASSAIOPSIS, *Dcne & Planch Gen Pl, I 945*

Large shrubs or trees glabrous and tomentose armed or not *Leaves* digitate or palmate or angled *stipules* connate within the petiole not prominent *Umbels* in large compound panicles young parts at least stellately tomentose bracts not large often persistent *pedicels* rising from a dense cluster of persistent bracteoles not jointed under the flower flowers often polygamous *Calyx* 5 toothed *Petals* 5 valvate *Stamens* 5 *Ovary* 2 celled styles 2 united long or short *Fruit* broadly globose or turbinate 2 or by abortion 1 seeded *Seed* not compressed albumen ruminated

Brassaiaopsis mitis, *C B Clarke Fl Br Ind, II, 736; ARALIACEÆ*

Vern—*Moqchim* NEPAL *Suntong* LEPCHA

Habitat—A small tree of Sikkim Himálaya above 5,000 feet common at Darjiling

Structure of the Wood—Soft white spongy Weight 24 lbs per cubic foot

B speciosa, *Dcne & Planch, Fl Br Ind, II, 737*

Syn.—*B FLORIBUNDA* *Seem*

Habitat.—A small tree met with from Nepal to Assam and Chit-tagong

Structure of the Wood—White, soft, resembling the preceding

791

MEDICINE.
Plant.
792
Leaves
793
Root
794

795

796

TIMBER.
797

TIMBER
98

B 798

BRASSICA

The Mustard Family

799

BRASSICA, Linn Gen Pl I, 84

A remarkable group of plants belonging to the Natural Order CRUCIFERÆ. There are supposed to be some 80 species natives of the temperate regions of the Old World but under cultivation the forms have been increased almost indefinitely.

Glabrous or hispid herbs root stock often woody. Leaves large pinnatifid or lyrate rarely entire. Flowers yellow in long racemes. Sepals erect or spreading lateral usually saccate at the base. Pods elongate terete or angular often with an indehiscent 1 seeded beak valves convex 1 3 nerved lateral nerves flexuous style beaked or ensiform stigma truncate or 2 lobed. Seeds 1 seriate globose or sub compressed cotyledons incumbent concave or conduplicate the radicle within the longitudinal fold.

The generic name is derived from the Latin *Brassica* and the Celtic *Bresic* or *Braisscagh*. Nearly all the species of this interesting and most valuable genus exist entirely in a state of cultivation. They are anti scorbutic. It may be stated that no plant with a 4 merous condition of the corolla and with 4 long and 2 short stamens is known to be poisonous. These are the eye marks of the CRUCIFERÆ a family which yields the majority of the vegetables used by the inhabitants of temperate countries. Of the Cruciferous genera *Brassica* is the most important. To it belong the mustard the cabbage the cauliflower the broccoli the borecole and the turnip with their innumerable varieties. The following are the important Indian wild or cultivated species with their principal culinary forms.

The various species of *Brassica* met with in India may conveniently be referred to two important sections.

1st—Those which may be regarded as of Asiatic origin—i.e. are either indigenous to Asia or were introduced at an early date.

2nd—Modern introductions or the species which may be viewed as most probably European forms of the genus.

The former includes the varieties and races of *Brassica campestris*, *B. juncea* and *B. chinensis* the latter *B. alba*, *B. nigra*, *B. oleracea* and *B. rapa*. The European members are easily recognised and there can be no possible confusion regarding them but unfortunately it is quite otherwise with the Asiatic forms. Messrs Duthie and Fuller (*Field and Garden Crops*) have however contributed a most valuable paper on this subject which has gone a long way to clearing up many of the doubtful points regarding these plants. I take the liberty to reproduce here their most useful analysis of the botanical characters of the Asiatic species—

* Foliage usually glaucous and smooth rarely hispid leaves amplexicaul auricled seeds yellow or brown

† *Corymbs* few flowered sepals erect pods very thick, not torulose 2 3 4 valved seeds large yellow or brown

Pods erect, 2 valved

B. glauca Roxb

Pods pendulous 3 4 valved

B. trilocularis

Pods erect 4 valved

B. quadrivalvis

†† *Corymbs* many flowered sepals spreading pods stoutish somewhat torulose seeds brown or reddish brown rather large minutely rugose

Pods not torulose slender with a long

tapering beak seeds dark brown *B. dichotoma*, Roxb

The White Mustard

BRASSICA
alba

Pods somewhat torulose short with sharp beak seeds reddish brown **B glauca** Royle var **Toria**

** Foliage usually bright green and more or less hispid leaves stalked or the upper ones sessile not amplexicaul pods thin torulose seeds small dark brown or reddish brown distinctly reticulated
B juncea and **B chinensis**

From an agricultural point of view the Asiatic forms may be referred to three important sections

- (a) *Sarson* may be called the Indian rape and colza series
- (b) *Toria* is exported either as mustard or as rape
- (c) *Rai* commonly known as Indian mustard

How far it is possible to separate the *sarsons* into groups corresponding to the rape and the colza of Europe may be doubted but the line which separates these from *toria* and from *rai* is well marked and should be carefully observed. The various forms of *sarson* are seldom grown alone but constitute an element in mixed crops being generally sown in Upper India at least along with nearly every crop of wheat and barley. On the other hand *toria* is nearly always grown by itself.

If not destroyed by blight *sarson* or *toria* (*lahi*) is a most valuable crop—much more so in fact than either wheat or barley. The danger of blight is however very considerable and few small cultivators care to risk an entire failure in the hope of a good crop which if good is of course very remunerative hence the rapes and also mustard are generally grown as mixed crops. In India as a whole mustard (*rai*) is not so extensively cultivated as rape. It is a mixed crop the weight of oil obtained is only one fourth instead of one third and it is also less esteemed as an article of food. It is a little difficult to determine what is meant by mustard in the returns of Indian export trade but that the amount of true mustard must be very small seems beyond doubt indeed it is highly probable that neither **Brassica alba** nor **Brassica nigra**—the true mustards of European commerce—are ever exported from India. It seems quite likely that the better classes of each of the above Asiatic crops are exported as Mustard and the inferior as Rape.

Brassica alba, *H f & T T Fl Br Ind I, 157*

800

THE WHITE MUSTARD

Vern—*Suféd-rai* *suféd rayan* HIND *DUK Dhép-rai* BENG *Pan dhora mohare* MAR *Ujlo rai* GUJ *Vellai kadugu* TAM *Tella aralu* TEL *Vella kati ka* MALA *Bili sasave* KAN *Siddhārtha shvetasarshapa* SANS *Khardale abyas* ARAB *Sipandane supid* PERS *Suddu abbe* SINGH *Aphiyu munniyé* BIR

Habitat—This is supposed to be a native of the more southern portions of Europe and of Western Asia.

Botanic Diagnosis—This is the plant which yields the so-called White Mustard. It is by no means a common plant but may be recognised by its large yellow flowers and spreading hispid few seeded pods with a long empty and flat beak. (Compare with **B Nigra**)

Properties and Uses—

The seeds large and white

The flour rarely used alone

The oil little known

The plant is also eaten as salad the seeds being sown thickly and the young seedling plants cut when about 2 inches high the leaves and young sprouts are also eaten as a green vegetable. The cake is much used in Europe to feed sheep. It is regarded as fattening for sheep black oil-cake is not considered so good for this purpose.

FOOD
Seeds
801
Flour
802
Oil
803

B 803

**BRASSICA
campestris.****Colza and Rape.**Leaves and
sprouts.

804

Oil cake

805

MEDICINE

806

When triturated with water the seeds form a yellowish emulsion of very pungent taste but it is inodorous and does not under any circumstances yield a volatile oil. The powdered seeds made into a paste with cold water act as a highly stimulating cataplasm. The entire seeds yield to cold water an abundance of mucilage (*Fluck and Hanb Pharmacog*)

Medicine—White mustard alone must be regarded as useless but it is invariably mixed with black in the preparation of mustard flour

Chemistry—The vesicating or stimulating properties of white mustard are due to sulphocyanate of acrinyl. It does not pre exist in the seed and cannot be obtained by distillation (For further information see **B nigra**)

807

Brassica campestris, Linn Fl Br Ind, I 156

To this species belong the turnip the rape coleseed colza and other forms known in Europe. The Indian examples may be said to be represented by *sarson* and *toria*. It is necessary to make some attempt at referring the Indian forms to their sub species and varieties but until the subject has been more carefully investigated very little of a definite and trustworthy nature can be given. The greatest possible difficulty exists in separating the economic and trade facts which have appeared in Indian works and reports on the subject mistakes are almost unavoidable. But before attempting to establish the varieties of the Indian members of this species it may be found convenient to give in this place a brief indication of the arrangement adopted in Europe so that comparison may be possible with the Indian plants

*European Forms of Brassica campestris***SUB SPECIES I—campestris proper**

Colza.

808

COLZA WILD NAVEW or NAVETTE, COLESEED, SWEDISH TURNIP *Eng*; **CHOU DES CHAMPS** NAVETTE, *Fr*

Botanic Diagnosis—*Root* tuberous *Leaves* glaucous radical hispid upper glabrous *Racemes* close the open flowers rising above the buds and caducous before the corymb lengthens into the raceme

This is the wild coleseed of the fields of England and of many parts of Europe. It is sometimes cultivated in France for its seed—the *colza colsa* or *colsat* the *chou oleifere* of the French. It is unfortunate that in England and indeed in many parts of the Continent the name coleseed or colza has been applied to rape as a synonymous term. They are perfectly distinct the seed produce of colza is much greater in quantity though inferior in value to rape. Colza is much grown in France and Belgium but by the British farmer it is supposed to exhaust the soil. The Swedish turnip is a cultivated form of this plant bearing the same relation to the normal form which the *khol rabi* does to the cabbage

It seems very probable that the hairy plants which Roxburgh called *Sinapis dichotoma* and *S trilocularis* as also *Brassica quadrilocularis* *H f & T* should be viewed as forms of this sub species and not of *Napus* as stated by *Messrs Duthie and Fuller*. The nature of the seed and of the oil yielded by these forms corresponds with that of the French and Belgium plant thus affording additional corroboration to the above suggestion based on the agreement of the botanical characters which exists between them. As cultivated crops however, they are quite distinct from rape. It would therefore be of considerable practical advantage to have the returns of these forms declared separately from those which more properly should be called Indian rape. This would be of importance even although it must be admitted that dried specimens of the former plant can hardly be distinguished from the latter

RAPE

809

B. 809

The Corresponding Indian Forms

BRASSICA
campestris.SUB SPECIES 2—*Napus*

RAPE NAVEW or COLESEED *Eng* CHOU NAVET, *Fr* DER RUBEN
KOHLE (*erm*)

Botanic Diagnosis—*Root* fusiform *Leaves* all glabrous and glaucous *Raceme* elongated at the time when the flowers expand (*Note*—The character of the raceme of this and of the preceding sub species would appear to have been reversed in some recent works on this genus)

Although *Napus* is largely seen as a weed of cultivation in corn fields especially in Scotland it may be viewed as an escape from cultivation As a crop the seeds yield the rape oil of commerce

It seems probable that to this sub-species should be referred *Sinapis glabra*, *Roxb* and *S glauca* *Royle*

810

SUB SPECIES 3—*Rapa*

THE TURNIP, *Eng* CHOU A FEUILLES RODES *Fr* DER RUBEN
KOHLE *Germ*

Vern—*Shalgham* HIND BENC PERS *Shalgham* ARAB

Botanic Diagnosis—*Root* tuberous *Radical leaves* green not glaucous hispid *stem leaves* glaucous and glabrous *Flowers* falling off before the corymb lengthens into a raceme

Habitat—Grown as a garden crop all over India

Properties and Uses—

The young leaves used as food

The root largely used as food

The seeds are chiefly used for propagation but an oil is also prepared from them The common cultivated Turnip may almost be said to be acclimatised in India and to have gained great favour with the natives as a vegetable The Brahmans and Baniyas have a prejudice against it however from a suspicion of a relation to beef or animal matter

Indian Forms

Speaking of the forms of *B campestris* met with in the North West Provinces Mr Atkinson in the manuscript which he has most obligingly placed at my disposal says The varieties known as *S glauca* and *S dichotoma* are well marked and are known by different names in almost every district and appear to be entitled to specific notice These forms he goes on to say are extensively cultivated in almost every district in the N W Provinces on account of the oil obtained from the seed They are however sparsely grown in the Benares District because there they are peculiarly subject to the attack of *labo* a small black fly

THE TURNIP
811Var 1—*dichotoma*, sp *Roxb*

It seems probable as already indicated that owing to the hairiness of the leaves this should be viewed as a form of the sub species *B campestris* proper thus corresponding to the Swedish turnip and colza series

KÁLÍ SÁRSÓN (The Indian commercial name)

Syn—*SINAPIS DICHOTOMA* *Roxb* *S BRASSICATA* *Roxb*

Vern—*Káli sarsón* *kálé-rá* *sursi* *jariya* *lahota* *lata* *jadiya* HIND
Sursha *shurshi* or *sursi* *sanshi* *káli sarsón* *sáda* *rái* BENG *Sarsu*
RAJ *Kále-ráyan* DUK, *Surah* CUTCH *Sarsawa* *kála-rá* GUJ
Sherasa *kála-mohare* MAR *Karuppu kadugu* TAM *Nalla-avalu*
TEL *Karuppa katuka* MALA *Sarsive* *kappu* *rasoe* KAN *Sarshapa*
kála-sarshapa, SANS *Khardale-aswad* ARAB *Sipandéno-siyah* PERS
Kalu abbé SINGH *Amé mnnnyén-si* BURM

Botanic Diagnosis.—Upper leaves lyrate or entire amplexicaul lower auricled deeply pinnatifid the ground ones being more or less hairy,

812

B 812

**BRASSICA
campestris.****Rape-seed**

FOOD
Leaves
813
Seed
814
Oil cake
815
OIL
816
817

used for culinary purposes Pods sub-cylindrical 2 3 inches long with a long tapering beak seeds small dark or light brown smooth or minutely rugose

I am inclined to think a serious mistake has been made by European authors in regarding this variety as identical with *S. glauca* Roxb. The latter plant yields a decidedly superior oil and both seeds and plant are readily distinguished by the most ordinary native and their properties narrated with precision

Oil—Colza oil is used by the natives of India chiefly to anoint the body and for illuminating purposes

§ On this side of India the oil (*Sarasin* Guj.) is used for pickles and culinary purposes the oil cake is given to cattle (*Assistant Surgeon Sakharam Arjun Ravat Girgaum Bombay*) It seems probable that the above remark should be transferred to the next variety (*G. Watt*)

Var 2—glauca, sp. Roxb

This seems to belong to the sub species **Napus**

RAPE SEED RARA SARSON (the Indian commercial name) **Roxburgh** calls this **White Mustard**

Syn—*SINAPIS GLAUCA* Roxb

Vern—*Sarsón sarsón sard bara lai shetashirsa banga sarsón pila sarsón rara rada rara sarsón pili lai* HIND *Shwet rai* BENG *Ruka tuverika* SANS *Sarashire raira* GUJ *Pil r van* DUK

§ *Rura* 1 e like mustard (*Dr W Dymock Bombay*)

Botanic Diagnosis—The leaves are amplexicaul the lower deeply pinnatifid the ground ones being quite glabrous used for culinary purposes Pods very thick laterally compressed $\frac{1}{2}$ to $\frac{1}{4}$ inch in length with a broad flattened beak seeds round smooth light yellow or white but occasionally deeper coloured

Oil—It is highly probable that a great part of the so called mustard oil of India should be transferred to this position under the name of *sarsón* or Indian rape oil How far the oil from the next variety *toria* may also belong to this class cannot at present be determined but it has been deemed advisable to give here an abstract of all the available information regarding Indian rape oil Speaking of this plant **Roxburgh** says

The entire seed is used for various economical purposes an oil is also expressed from it which is much used in the diet of the Hindus **Rape** oil is expressed after the ordinary fashion of the oil presser or *tel* who returns to the cultivator one third of the weight of the seed in oil (*Duthie and Fuller*) The oil is expressed in the same manner as *til* by means of a large wooden mortar and pestle worked by cattle In Bulandshahar the seed sells at 12 seers for the rupee one maund yields 13 seers of oil and 27 seers of cake at a cost of 12 annas The oil sells at 3½ seers per rupee and the cake at 35 The oil is used in the preparation of condiments such as pickles preserves, curries and for other culinary purposes It is also used for burning though from its strong odour it is not a favourite with Europeans It is however capable of purification by agitation in a leaden vessel or with sulphuric acid and water (*Mr Atkinson MSS*) The oil which is most esteemed as an article of food amongst the Hindus is that obtained from *B. juncea* which see

Special Opinions—§ Combined with camphor it forms an efficacious embrocation in muscular rheumatism stiff neck &c Pure oil commonly used by natives of Bengal to anoint the body before bathing strengthens the skin and keeps it cool and healthy Sometimes used by suicides to dissolve opium thus hastening the effect of the narcotic The seeds pounded and mixed with hot water form an efficient counter irritant

FOOD
Leaves
818
Seed
819
Oil cake
820
OIL
821

Rape-seed

BRASSICA
campestris.

poultice (*Assistant Surgeon Shib Chunder Bhattacharj Central Provinces*) The oil is also used as an external application in dengue fever with great benefit (*Surgeon Major S A G Jayakar Muskat Arabia*) Is much used for rubbing on the chest in bronchitis especially of children (*Surgeon Major P N Mukerji Cuttack Orissa*) Similar action to mustard but less effective (*Surgeon W Barren Bhuj Cutch*)

Var 3—*Toria, Duthie and Fuller*

It seems probable that this should be viewed as a variety of the sub species *Napus* it has some resemblance to the summer rape of Germany the *navette d été* of France

Syn — *SINAPIS GLAUCA* Royle

Vern — *Tori toriya khetiya lahi* or *lai* also *dain* and *dain lai* HIND
Tuverika SANS

Botanic Diagnosis — The whole plant quite smooth and glaucous 2 3 feet in height Lower leaves lyrate or pinnatifid upper amplexicaul lanceolate entire The leaves are used for culinary purposes Flowers bright yellow sepals spreading Pods rather slender $1\frac{1}{4}$ to $1\frac{3}{4}$ long transversely compressed and more or less torulose beak about $\frac{1}{4}$ inch long Seeds small roundish or semi compressed reddish brown finely rugose

No definite information can be obtained regarding the oil expressed from the seeds of this form except that the oil is regularly expressed and that this plant is the staple mustard crop of the hills

As a rule it is grown alone and is produced in the greatest abundance in the districts which border on the Himalayan Terai In the North West Provinces and Oudh it occupies annually about 35 000 acres in the 30 temporarily settled districts yielding 4 to 6 maunds of seed per acre

RAPE SEED

From the preceding remarks the reader may have gathered that the Indian forms of *Brassica campestris* may with at least a certain degree of accuracy be referred to three primary sections —

Section I — *Colza* which corresponds to *Roxburgh's Sinapis dichotoma* and the abnormal forms of that plant which have come to be known as *B trilocularis* and *B quadrilocularis*

Section II — *Rape* or *Sinapis glauca*, *Roxb*

Section III — *Toria* or another form most probably of *rape* which has received the name of *S glauca*, *Royle*

There is every reason to suppose that II and III are commercially known as *rape* although perhaps the last may occasionally be classed as *mustard* These three forms individually represent agricultural products of the greatest importance to India They would seem sufficiently distinct to have justified their retention at least as varieties very much corresponding to the original species The natives display a highly developed power of observation in this direction they have long become perfectly familiar with these plants and can as a rule name them with unerring certainty In our trade returns however *rape* is always spoken of as if there was only one plant concerned It has hence become necessary to discuss the subject of *rape* collectively although it must be remarked that it is very desirable that an effort be made to distinguish the three forms and if possible to publish separate returns for each

Food — Whether or not it may be found correct to botanically sub divide the Indian forms of *B campestris* into two or three primary sections resembling *rape* and *colza* and to identify these sections with the corresponding European forms it cannot be doubted but that such a classification would serve a commercial purpose It would separate the oil which in Indian commerce is called *rape oil* from that which might with

822

FOOD
Leaves
823
Seeds
824
Oil cake
825
OIL
826

827

FOOD
Seed.
828
OIL
829
Oil-cake.
830

B 830

**BRASSICA
campestris.****Rape-seed**

advantage in order to remove confusion receive the name of colza as well as both these from mustard oil and the other oils obtained from the remaining members of the genus. It will be enough however to suggest this separation; subsequent research may reveal further corrections and subdivisions for there are many points which it is difficult to settle definitely in the present state of information. Perhaps the best botanical character that can be cited in support of the proposed separation is the glabrous nature of the ground leaves of the forms above referred to as *Navet* (rape) and the more or less hairy ground leaves of *S. dichotoma* corresponding with those of *Navette* (colza). The seeds in the former are smooth and light in the latter smooth or rough but dark coloured. Rape oil (*S. glauca*) is regarded as better in quality than (colza oil) the oil from *S. dichotoma*, the latter being used chiefly to anoint the body while the former is largely used in cookery and is exported to Europe for illuminating purposes and to meet a demand in the India rubber manufacture. As already stated in the trade returns of the exportation of rape oil and seed from India apparently both the above are included as different qualities of rape if not also the oil expressed from *B. juncea* and *Eruca sativa*.

In his *Panjab Products* Mr Baden Powell has mistaken these plants; he identifies *sarson* or rape with *Sinapis juncea*, mustard with *S. campestris*, of which he apparently views *S. alba* and *S. nigra* as varieties. Regarding Mr Atkinson as correct I have in substance followed the admirable division given by him in his *Himalayan Districts* page 770 also in the private MSS from which one or two passages have already been extracted.

In European commerce rape and colza are names which unfortunately have come to be used almost synonymously. The separation here recommended of the probably corresponding Indian forms has been deemed advisable chiefly with a view to more clearly identifying the Indian oils allied to mustard. The oils obtained from these are even more distinct than the oils from the European plants and their respective properties are well understood and appreciated by the natives of India. Some such separation seems highly desirable. Simmonds in his *Tropical Agriculture* (1877) remarks of Indian so-called rape seed that 'the prices in the London market in the beginning of 1877 were for Calcutta brown 59s 6d to 60s per quarter and for Ferozepore 59s'. Under mustard he seems to include *S. chinensis*, *S. dichotoma*, *S. pekinensis*, *S. ramosa*, *S. glauca*, and *S. juncea* as the mustard yielding species of Asia. The majority of these plants are those which yield the so-called rape seed as exported from India. *Brassica (Sinapis) juncea* alone falling within those pronounced to be mustard. In fact it is probable as already stated that the bulk of the seed exported from India as mustard is obtained from *B. juncea*, and not from *B. alba* and *B. nigra*, the true mustards.

In India rape seed is very commonly sown mixed with mustard seed and almost as an auxiliary with grain crops. It prefers loams and does not thrive on clay soils. The sowing takes place in October and the harvest in the following February the plants being cut somewhat prematurely otherwise the pods would burst and much of the seed be lost. The latter is ripened by exposure to the sun for 3 or 4 days on the threshing floor and is then easily dislodged. The Indian seed known as Guzerat Rape largely crushed at Dantzic is found to yield 3½ per cent more oil than European seed, and leaves a cake richer in fatty matter and albuminoids; it is shipped from Bombay and brings the highest price of any. (*Spons. Encycl.*)

A good deal has been written regarding the superiority of this so-called Guzerat rape. It seems to be a superior quality of var *Toria* or of var

Trade in Rape and Mustard

BRASSICA
campestris.

glauca In the *Bombay Gazetteer* occurs the following notice of this form

Rape-seed *sarsón* Brassica Napus holds the first place among oil seeds and the third place among crops in general (in Kadi sub-division) Land intended for it is left fallow for four months and ploughed twenty times before the seed is sown The crop does not require any watering The seed is sown through drills in November at the rate of from 2 to 3 *sirs* to the *bigha* and reaped in March and the average yield varies from 400 to 800 lbs When the crop is grown in *bajarvada* land the yield is small and rarely exceeds 200 lbs The rape seed grown in this division is of a better description than any in Gujarat and has a larger grain The produce forms one of the chief articles of export (*Bomb Gaz VII 77*) The Kew Report of 1877 says Guzerat rape seed has been crushed at Dantzig and is found to yield 35 per cent more oil than rape the cake also yields 10 per cent fatty matter and 34 per cent albuminoids both being in excess of the amounts yielded by ordinary rape

In an official correspondence with the Home Department regarding a proposed future edition of the *Pharmacopœia of India* the Bombay Committee describe a Gujarat plant under the name **B juncea** from the botanical characters given one is compelled to believe this must be **B campestris**, *var Toria* The leaves are said to be glabrous and attenuated at the base the upper ones lanceolate and entire The seeds are oblong light brown and minutely reticulated These are certainly not the characters of the hairy petiolate non attenuated leaves of **B juncea**, nor the characters of the seed of that plant If this presumption proves correct it is a remarkable fact that the medicinal virtues of the mustard should be attributed to a form of rape. It is probable however that the botanical description is not that of the plant for which the medicinal virtues have been given A chemical analysis of the Gujarat seed would put at rest all possible misunderstandings (See Chemical note regarding mustard and rape)

TRADE RETURNS

INTERNAL TRADE

In the returns of Internal Trade the quotations are sometimes given as Rape mustard not being mentioned sometime as Mustard and apparently no rape and again as Rape and Mustard jointly It is thus impossible to separate these so as to show the relation of each to the foreign exports which are published separately for Rape and for Mustard Of rape and mustard the North West Provinces and Oudh exported 1 545 327 cwt valued at Rs 50 66 068 during the year 1883 84 Bombay imported 1 120 345 cwt valued at Rs 66 85 583 and Calcutta imported 2 773 621 cwt the bulk of which was borne by the East Indian Railway

EXTERNAL TRADE

The following table shows the exports of rape-seed to other countries by sea during the six years ending 1883 84 —

| YEARS | Quantity in Cwt | Value in Rupees |
|---------|--------------------|--------------------|
| 1878 79 | 2 165 475 | 1 36 67 869 |
| 1879-80 | 1 380 572 | 85 37 717 |
| 1880-81 | 1 255 580 | 67 10 338 |
| 1881-82 | 1 935 621 | 1 03 19 272 |
| 1882-83 | 2 821 420 | 1 57 05 233 |
| 1883 84 | 3 945 727 | 2 44 14 331 |

**BRASSICA
juncea.****Indian Mustard**

The following analysis of the exports of rape seed for the year 1883 84 shows the Presidencies or Provinces whence exported and the countries to which consigned —

| Presidency or Province from which exported | Quantity in Cwt | Value in Rupees | Country to which exported | Quantity in Cwt | Value in Rupees |
|--|------------------|--------------------|---------------------------|------------------|--------------------|
| Bengal | 1 662 023 | 89 34 889 | United Kingdom | 1 970 395 | 1 07 95 473 |
| Bombay | 1 302 623 | 97 12 685 | Austria | 2 400 | 18 300 |
| Sind | 887 970 | 57 29 168 | Belgium | 671 879 | 45 35 799 |
| Madras | 63 111 | 3 37 589 | Denmark | 4 910 | 32 730 |
| | | | France | 776 204 | 55 02 402 |
| | | | Germany | 304 754 | 21 73 768 |
| | | | Italy | 34 821 | 28 51 680 |
| | | | Egypt | 178 792 | 10 9 683 |
| | | | Aden | 1 400 | 10 675 |
| | | | Other countries | 172 | 821 |
| TOTAL | 3 945 727 | 2 44 14 331 | TOTAL | 3 945 727 | 2 44 14 331 |

833

Brassica juncea, H f & T Fl Br Ind I 157**THE RAI OF INDIAN MUSTARD**

Syn — *SINAPIS RAMOSA Roxb* *S CUNEIFOLIA Roxb* *S RUGOSA Roxb*
S NURCEA Linn *S JUNCEA Linn*

Vern — *Rai sarsón sarsón lahi go na sarsón bari r i barlai budshahi*
rai shahsada r i kha rai HIND Rai sarisha BENG Asur KASH
MIR Rai GUJ KUTCH Rai sarsón riyiku BOMB Mohari rayan
MAR Rajika SANS Abba SINGH

Habitat — Cultivated abundantly in India it extends westward to Egypt and eastward to China This is in fact the plant which in India bears the name of mustard and takes the place of *B nigra* in all warm countries In the North West Provinces and Oudh it is generally sown on borders of fields of wheat barley or peas sometimes broadcast 3 lbs per acre of seed being required and yielding an outturn of 3 to 4 maunds to the acre It is largely grown in the south of Russia and in the steppes north east of the Caspian flourishing on saline soils At Sarepta Saratoo it has been largely cultivated for a century and it is also grown in Central Africa.

Botanic Diagnosis — A tall erect annual 3 5 feet in height with bright green foliage rarely glaucous more or less hispid towards the base stems much branched smooth terete often tinged purplish red especially at the joints Leaves not amplexicaul the lower ones stalked lyrate or pinnatifid margin variously serrate dentate often very hispid especially when young petioles channelled upper leaves sub sessile linear lanceolate smooth dentate or the uppermost quite entire Racemes terminal flowers stalked pedicels elongated in fruit divaricate calyx with linear boat shaped spreading sepals Petals small bright yellow Pods slender 1 2 inch long sub compressed torulose beak about $\frac{1}{3}$ the length of the pod valves with a prominent midrib Seeds small sub globose dark or reddish brown with a rough reticulated testa (*Duthie and Fuller*)

§ The measurement of the seeds might be given as our brown mustard is very much larger than the Guzarat mustard and has ovate-lanceolate or runcinate toothed leaves (*Surgeon Major W Dymock Bombay*) The seeds of this species are much smaller than those of any of the preceding forms (*G Watt*)

Indian Mustard

BRASSICA
juncea

Cultivation of Indian Mustard—In Bengal this is a much more important crop than rape. In the Mánbhum district (see *Hunter's Statistical Account of Bengal*) it is sown in dry land in October and cut in February. It is sometimes sown alone or as a mixed crop with peas *musarí* barley &c grown on high lands. In Cuttack it is described as sown in October and reaped in January and as luxuriating on soils where salt is deposited. In Julpágori Mustard is extensively grown as an oil seed and next to rice is the most important crop of the district. It is sown broadcast on highlands in November and December and is reaped in March and April. The young leaves of the plant are used as a vegetable. In the Administration Report of Bengal for 1882-83 it is stated that in Bengal proper mustard seed is of greater importance than lin seed. Of all description of oil mustard oil is the most largely consumed and most relished by the people. Poor lands and lands recently reclaimed from jungle are generally sown with it the yield being considerable in comparison with the small amount of labour required for cultivating and preparing the land. This species is not cultivated in the North West Provinces to the same extent as *B campestris*, *sarsón* though it is the staple crop of Kumaon. The seeds are exported for their oil (*Mr Atkinson's MSS*). Detailed information regarding the relative amount of this crop as compared with rape cannot be obtained from the provincial reports but it may be stated that it is a much more important crop in Bengal than in the other provinces.

Properties and Uses—

Food—The leaves are used as a vegetable. In Kumaon the plant is cultivated chiefly for its leaves which are eaten (*Atkinson*). When the supply of fodder happens to run short in January or February the mustard crop is frequently cut green and given to cattle.

The seeds are small round dark distinctly reticulated. About 15 to 20 occur in each cell of the pod in these respects *B juncea* seems recognizable from the other members of the genus most of which have large light coloured or yellow seeds generally smooth with rarely more than half the number of seeds in the pod.

Ground into flour they are used largely as an adulterant with the true mustard. The seeds whole or broken are often used to flavour curries. By pressure they yield more than 20 per cent of a fixed oil which is used in Russia in place of olive oil.

Indian Mustard Oil—*Roxburgh* apparently regarded this oil as inferior to rape oil. This does not appear to be the case. It is of a much purer kind than that from *B campestris*, it has not the peculiar rancid smell characteristic of rape and colza. It is clearer in colour and is used almost entirely as an article of food being the oil most generally employed in the plains of India for that purpose. This seems to be the oil called mustard oil so largely prepared in our jails by convict labour. The seeds are reported to yield from 20 to 25 per cent of oil.

Mustard Flour—As has been already stated this plant may be called the Indian Mustard. In point of structure it is perhaps more nearly allied to the true Mustard than to any other member of the genus. Its properties seem also very similar and in fact the seeds are largely used to adulterate or as a substitute for mustard in the preparation of Mustard flour.

Medicine—The seeds commonly met with in the bazars of India which from their colour may be denominated *Brown Mustard Seed* possess properties similar to those of the Black and White Mustard Seed for which they may be employed as an efficient substitute especially in the preparation of mustard poultices (*Pharm of Ind*).

Under the name of *B juncea* the Bombay Pharmacopœia Committee

834

FOOD
Leaves
835
Seeds
836
FODDER
837

OIL
838

FLOUR
839

MEDICINE
Seeds
840

BRASSICA
nigra**Black Mustard.**

give the following Externally used in internal congestions, in spasmodic neuralgic and rheumatic affections and in morbid states of the cerebro-spinal system, as an emetic in ebrietas and other cases where it is desirable simply to empty the stomach without inducing a depressing influence in the system In native practice for external use it is often combined with moringa bark or garlic which greatly increases its activity Taken internally in moderate quantities it acts as a digestive' (Compare with the note regarding above under Rape page) The *United States Dispensatory* says 'The mustard flour which the seeds yield is of a very fine yellow and affords on distillation the oil of black mustard' (15th Ed p 1305) The seeds closely resemble those of **B nigra**, and afford when distilled the same essential oil (*Fluck and Hanb Phar macog* 68)

841

Brassica nigra, Koch Fl Br Ind I 156

THE BLACK OR TRUE MUSTARD *Eng* MOUTARDE NOIRE, *Fr*
MUSTERT SEUFSAMEN *Ger* SENAPA *It* MOSTARDA, *Por*

Syn—*SINAPIS ERYSIMOIDES* Roxb *SINAPIS NIGRA* Linn

Vern—*Rai kalirai tira tará mira lahi banurasi rai jag rai asl-rai ghorrá makra rai &c* HIND *Raisarisha* BENG *Ras kali rai* GUJ
Rai sarsan BOMB *Kadagho* TAM *Avalo* TEL *Bile sasive kari sasive sasive* KAN *Rajiká (?) sarshap* SANS *Sarshaf* (the name by which it is known in Indian hospitals) PERS *Khirdal* or *khardul* ARAB
Ganaba SINGH *Kiditsai* CHINESE

§ Madras vernacular names are the same as those given in page 523 under var 1—*dichotoma*, sp Roxb (*Moodeen Sheriff*)

Habitat—Cultivated in various parts of India and Thibet chiefly on the hills It is found wild over the whole of Europe excepting in the extreme north

Botanic Diagnosis—This may be distinguished from **B alba** by its stem clasping or adpressed and nearly glabrous short pods

History—Mustard was well known to the ancients It is mentioned by *Theophrastus Dioscorides Pliny* and it has been cultivated as an article of food in Europe since the thirteenth century Its essential oil was first noticed in 1660

Food—The leaves are all petioled the lower lyrate and the upper entire They are used for culinary purposes

The seeds are about $\frac{1}{8}$ to $\frac{1}{10}$ of an inch oblong and dark-coloured with a reticulated surface

True Mustard Oil—A bland oil expressed from the seed is used for various economic purposes About 23 per cent is usually expressed The oil is inodorous non drying and solidifies at 0° F It consists essentially of glycerides of stearic oleic erucic and brassic acids the last being homologous with oleic acid An essential oil is obtained through the action of water (See *Chemical Composition*)

Medicine—The seeds of this plant are used in medicine as poultice, being a useful and simple rubefacient and vesicant Mustard poultices prove highly serviceable in cases of febrile and inflammatory diseases internal congestions spasmodic neuralgic and rheumatic affections Mustard flour in water is highly recommended as a speedy and safe emetic The bland oil is largely prescribed by native doctors

The seeds or flour act as a digestive condiment if taken moderately If swallowed whole they operate as a laxative and for this purpose are sometimes prescribed in dyspepsia and other complaints attended with torpid bowels

Chemical Composition.—"Both black and white mustard seeds contain a fixed non drying oil which is obtained by expression, the amount varying

FOOD

Leaves

842

Seeds

843

OIL

Bland.

844

Essential

845

MEDICINE

846

847

B. 847

True Mustard

BRASSICA
nigra.Chemical
Composition.
847

from 25 to 35 per cent this forms the mustard oil of commerce Mustard oil contains erucic stearic oleic and sinapoleic acids White mustard seed oil in addition to these acids contains tenic acid. (*Fluckiger*) On distillation black mustard yields a volatile oil the essential oil of mustard This volatile oil does not exist ready formed in the seeds but is a product of the action of the myrosin on myronate of potash now called sinigrin While the seeds are dry these bodies do not come in contact but directly water is added the myrosin decomposes the sinigrin into sulphocyanid of allyl essential oil of mustard sugar and a potash salt of sulphuric acid It is to the essential oil of mustard that the pungent smell and taste of mustard is due Applied to the skin it causes almost instant vesication Myrosin is an albuminous principle and at a temperature of 140° Fahr coagulates and then ceases to have the power of decomposing sinigrin When therefore the pungency of mustard is required boiling water should never be employed in the preparation White mustard seeds do not yield this volatile oil on distillation with water The seeds contain in addition to myrosin a crystalline principle of sulphosinapisin—sinalbin In the presence of water and myrosin this body splits up into sulphocyanate of acrinyl sulphate of sinapine and glucose The vesicating properties of white mustard are due to the first mentioned of these bodies" (*Surgeon C F H Warden Prof of Chemistry Calcutta*)

Special Opinions —§ The pure fresh oil is a stimulant and mild counter irritant when applied externally As such it is very useful in mild attacks of sore throat internal congestion and chronic muscular rheumatism The oil is also used as an article of diet and is rubbed on the skin before bathing (*Surgeon D Basu Faridpore*) Mustard oil with camphor may be rubbed in rheumatism with advantage Mustard poultices should be removed when the skin is reddened otherwise troublesome vesication is caused intractable ulcers resulting 'The small black variety called *benarasy ras* is as good a rubefacient as English mustard (*Bolly Chund Sen Teacher of Medicine*) In common oil mills in jails a maund of good seed yields 13 seers of oil The oil rubbed on the feet and the bridge of the nose cuts short a head cold in one night I have never seen it fail In slight bronchitic affections of children it makes a very useful mild counter irritant application to the chest It is also a very useful application in ordinary sore throat (*Surgeon K D Ghose Khowlna*) The oil rubbed over the chest in children has a great effect in relieving bronchial irritation In influenza the oil rubbed on the feet after a foot bath gives immediate relief A little rubbed on the nose stops the running within a few hours (*Surgeon K D Ghose Bankura*) Mustard oil is very useful as a liniment to the chest in cases of bronchitis (*Hony Surgeon P Kinsley Ganjam Madras*)

Mustard oil—

- (1) Is used by natives to anoint the body before bathing It prevents excessive perspiration and prickly heat also protects the skin from the direct rays of the sun
- (2) Is used to anoint infants after oiling they are exposed to the sun This process is said to render the skin tolerant of the excessive heat
- (3) As a substitute for lard or *ghee* it is extensively used in cooking
- (4) Internally a few drops taken after meals promote digestion and act as a mild cholagogue and diuretic
- (5) The oil is very efficacious as a stimulating liniment in cough catarrh, &c' (*Surgeon L Dutt, Pubna*)

**BRASSICA
nigra.****Mustard Flour**

848

MUSTARD

The majority of the plants to which Europeans in India give the name of mustard should be transferred bodily to rape and its associates to which they are certainly much more nearly allied. The true mustard is very scarce in India and seems to have been introduced. Ainslie fixes its introduction within the present century and the first time Roxburgh saw the plant was when raised from seed sent him from the Wynaad in South India. It is nowhere extensively cultivated but is met with chiefly on the hills and it is more than probable that it existed on the Himálaya from remote times although unknown to the fathers of Indian botanical science. It is quite likely however that the ancient Sanskrit writers had not seen the true black and white mustard and that the word *vājika* may have originally denoted a form of *Brassica juncea*, and the word *siddhartha* a form of *B campestris*. Nowa days these names are chiefly applied to the true black and white mustard *B nigra* and *B alba*, respectively. *Brassica juncea* is the principal source of Indian mustard.

Mustard
Flour
849

The seeds of the black and white mustard are ground into what is known as mustard flour. The French mustard flour is much darker in colour than the English because the seeds are not first husked. It is much more acrid and pungent for the husk contains the principal store of pungency. Mustard flour is never prepared in India or at all events never used as a condiment except in making pickles from green mangoes and other sub acid fruits. The seeds are ground and used as a poultice and the expressed oil is also used medicinally. In Japan and China mustard is regarded as a medicine of great importance. The ancient Hindus do not appear to have known the essential oil of mustard. This oil as already stated does not exist in the seeds but is chemically produced by the action of water as for example when a seed or a little of the flour is put into the mouth. Chemically mustard seed consists of a bland fixed oil (obtained by pressure) and a peculiar inodorous substance called myronic acid, together with a third substance which has been called myrosyne. By the action of water upon these substances the essential oil is produced which is known chemically as pyrosyne.

White mustard is much inferior commercially but is generally mixed with black mustard. It is said to be cultivated at Ferozpur, but is scarcely known in India. The white oil cake is a valued food for sheep.

In the preparation of mustard flour the relative quantities of black and white mustard used are commonly two parts of black to three of white, but the proportions vary. In Russia *B juncea* is ground into mustard flour and so may most of the other Indian species but they yield an inferior article to the true mustard flour of commerce and as already indicated their true position is with the rape and colza of Europe. It is much to be regretted that the true mustard *B nigra* and *B alba* the rape *B Napus* (or in India *B glauca*) the colza *B campestris proper* (or in India *B dichotoma*) and *B juncea* if not also *Eruca sativa* have become hopelessly confused in our trade reports under the common name of rape and mustard. A considerable injury has thereby been done and a check given to the development of foreign trade in these seeds. It will require time and careful observation to remove this fully, and to identify and distinguish the commercial products.

The quantity of pure mustard produced in India cannot at present be very great. From the confusion referred to above, it is impossible to arrive at any very definite information, since we cannot determine how far the term 'Mustard' may be confined to the products of *Brassica alba* and *nigra*. The true mustard is cultivated chiefly on the hills, and

The Cabbage.

BRASSICA
oleracea

is used in medicine or for culinary purposes. In the official Catalogue of the Paris Exhibition of 1867 it is stated that 3,000 tons of flour equal to 2,000 000 francs worth were annually produced in France.

TRADE RETURNS

The Annual Statement of the Trade and Navigation of British India with Foreign Countries gives the following figures as the exports from India for the past five years under the head of Mustard —

Exportation of Mustard

| YEARS | Quantity in Cwt | Value in Rupees |
|---------|-----------------|-----------------|
| 1879-80 | 2 369 | 15 181 |
| 1880-81 | 17 448 | 1 03 240 |
| 1881-82 | 24 346 | 1 44 508 |
| 1882-83 | 23 145 | 1 37 750 |
| 1883-84 | 10,111 | 64 513 |

The following analysis of the exports of mustard for the year 1883-84 is interesting as showing the relative quantities produced in the various provinces and the more important foreign countries to which exported —

| Presidency from which exported. | Quantity in Cwt | Value in Rupees | Country to which exported | Quantity in Cwt | Value in Rupees |
|---------------------------------|-----------------|-----------------|---------------------------|-----------------|-----------------|
| Bengal | 471 | 2 860 | Belgium | 357 | 2 176 |
| Bombay | 9 260 | 59 061 | France | 7 903 | 49 980 |
| Madras | 380 | 2 592 | Mauritius | 399 | 2 552 |
| | | | United States | 675 | 4 725 |
| | | | Ceylon | 200 | 1 391 |
| | | | Straits Settlements | 237 | 1 477 |
| | | | Other countries | 340 | 2 212 |
| TOTAL | 10 111 | 64,513 | TOTAL | 10,111 | 64 513 |

Brassica oleracea, Linn DC Prod, I, 213

THE CABBAGE AND ITS ASSOCIATES

Vern — Kópi BENG Kóbí karam kalla, HIND Kóbí Guj Karam kí
bháji karam ká sag DUK Gós-kíre TAM. Gós-kúra TEL.

Habitat — A much valued cold season vegetable introduced by Europeans into India. A large, coarse form, extensively cultivated by the natives has become perfectly acclimatised and the early cabbages met with in the market are the young heads of this plant.

Medicine — The seeds are diuretic laxative, stomachic and anthelmintic. The leaves form a good application in gout and rheumatism.

To this species the Cabbage and all its associates belong, these are supposed to have been produced by cultivating the European Wild Colewort or Wild Cabbage.

850

851

FOOD
852MEDICINE.
853

B. 853

BRICK-CLAYS

Clays suitable for Brick-making

The following are the principal forms —

- B** (oleracea) *sylvestris*—The Wild Colewort
B (oleracea) *acephala*—The Green Kale or Borecole
B (oleracea) *bulleata*—The Savoy Cabbage
B (oleracea) *gemmifera*—The Brussels Sprout
B (oleracea) *capitata*—The Red and White Cabbage
B (oleracea) *caulo-rapa*—The Turnip stemmed Cabbage or *Kol Rabi*
B (oleracea) *botrytis*—The Cauliflower and Brocoli

Brassica quadrivalvis, *H f & T T*, see **B trilocularis**, *H f & T T*

854 **B. Tournefortii**, *Gouan Fl Br Ind I, 156*

Habitat—Is said to be cultivated between Ajmir and Delhi but is unknown commercially

The flowers are pale yellow and the seeds large and compressed

855 **B trilocularis**, *H f & T T Fl Br Ind, I 156*

Will probably prove a cultivated form of **B campestris** as already indicated being very nearly allied to the hairy form known as var *dichotoma*. The seeds are large and white. An interesting series of specimens prepared by Mr Duthie, Superintendent of the Botanic Gardens Saharanpur has been placed in the Calcutta Botanic Gardens herbarium. These seem to prove that the number of the valves in the fruit is of little or no importance, but depends more upon treatment than upon specific peculiarities

856 **BRAYERA**, *Kunth Gen Pl, I, 622*

Brayera anthelmintica, *Kunth ROSACEÆ Dc Prod II, 588*

Vern—*Cusso* or *Konso* (?) *Kabsun kafsun* ARAB and HIND

Habitat—Native of Abyssinia imported into India and sold by druggists

MEDICINE **Medicine**—The dried flowers and tops are anthelmintic

857 § A bazar commercial article in Bombay it comes direct from Africa (*Surgeon Major W Dymock Bombay*)

Bread fruit tree, see *Artocarpus incisa*, *Linn URTICACEÆ*

858 **BREYNIA**, *Forst Gen Pl, III, 276*

Breynia rhamnoides, *Mull Arg EUPHORBIACEÆ Dc Prod, XV, pl 2 440*

Syn—*PHYLLANTHUS SEPIARIA Roxb MELANTHUS RHAMNOIDES Wight Ic t 1898*

Vern—*Tikkar* OUDH

TIMBER. **Habitat**—A large shrub or small tree common in the Oudh forests and in Banda Bengal and South India

860

BRICK-CLAYS

Brick-clays.

“*TERRE à BRIQUES, Fr ZIEGELERDE, Ger ARGILLA DA FAR MATTONI, Ital*”

‘In the neighbourhood of most of the large rivers in India, clays are to be found more or less suitable for brick making but little selection of good deposits has as yet been exercised, except in the larger cities or in

B. 860

The *Briedelia*.**BRIEDELIA**
montana.

connection with railway works As a rule Indian made bricks do not bear any reputation for strength or durability though in many cases their inferiority is due to the system of manufacture rather than to the material available

' The largest brick factory in India is the Government one at Akra near Calcutta Within the last fifteen years the demand for first rate bricks in Madras has increased enormously and this has been met by very excellent productions from the numerous seams of clay in the alluvial deposits of that part of the Coromandel On the west coast and particularly at Cannanore the clays have been largely utilised in the brick and tile productions of the Basel Mission (See *Manual of the Geology of India Pt III p 569*) (Contributed by Superintendent Geological Survey of India)

BRIDGES—Timber used in the construction of

[Note - Nearly every timber might be used for this purpose but the following are those specially mentioned by authors]

Azelia bijuga
Albizia procera
Alnus nitida (hooked sticks for rope bridges)
Bassia longifolia
Bischofia javanica
Calamus montanus
Calophyllum tomentosum.
Cedrela serrata.
Cedrus Deodara
Eucalyptus Globulus
Fagraea fragrans
Garcinia speciosa

Hardwickia binata
Mesua ferrea
Mimusops littoralis
Quercus annulata (used for the same purposes as *Q. lamellosa*)
Q. lamellosa
Parrotia Jacquemontiana
Pinus Gerardiana
Salix daphnoides
Schima Wallichii
Shorea robusta
Tectona grandis
Xylia dolabriformis

BRIDGES.
861**BRIEDELIA**, Willd Gen Pl III 267

A genus of trees shrubs or climbers belonging to the Natural Order EUPHORBIACEÆ There are 25 species natives of tropical Asia, Africa the Malaya and Australia

Leaves alternate entire short petioled generally distichous, with prominent parallel and lateral nerves *Flower* monœcious subsessile in axillary clusters bracts small scale like in male flowers numerous subsessile in the female few or solitary and often petiolate *Calyx tube* turbinate segments 5 valvate in bud *Petals* 5 small scale like stalked or spatulate blade often dentate In *male flowers* stamens 5 inserted on a central column placed on a flat sinuate disc *Female flowers* ovary 2-celled the base enclosed in the calyx tube and surrounded by an inner membranous cup-shaped or tubular disc variously lobed or laciniate which is inserted at the mouth of the calyx tube and is generally surrounded at its base by an outer fleshy annular disc style 2 bifid more or less connate at the base *Fruit* a berry enclosing 2 indehiscent cocci

Briedelia montana, Willd Brandis, For Fl 450; Gamble & Mac Timb 357

Vern—*Kargnahia khaja gesa kusi*, HIND *Geio* NEPAL *Kaisho Ass* *Kurgnulia* KUMAON *Asaná* MAR CUTCH, *Asano* BOMB GUJ *Faturfoda* GOA *Vengé-maram vengé* TAM *Gundebingula pantangi anem* TEL

Habitat—A moderate sized tree of the Sub Himálaya from Jhelum eastward ascending to 4000 feet Oudh and Bengal

Botanic Diagnosis—Branchlets and leaves wholly glabrous bracteoles numerous thinly membranous" (Brandis)

862

863

B 863

BRIEDELIA
stipularis**The Briedelia.****DYE**
864
MEDICINE
865**FODDER**
866
TIMBER
867**868**

Dye — **Dr Dymock** thinks that the leaves might be used in tanning
Medicine — Reported to possess anthelmintic properties Much used in Bombay and Goa as an astringent medicine The bark if soaked in water gives out much mucilage The fibrous portion is very tough and strong Briedelia bark is well known as a valuable astringent in Western India (*Surgeon Major Dymock Mat Med W Ind 589*)

Fodder — The leaves are lopped for cattle fodder

Structure of the Wood — Grey beautifully mottled annual rings distinctly marked by darker and firmer wood on the outside of each ring Weight 46 to 59 (?) lbs per cubic foot

It is very similar to that of **B retusa** and might be used for the same purposes

Briedelia retusa, Spreng Brandis, For Fl 449 Gamble's Man Timb 356

Syn — **B CRENULATA Roxb** and **B SPINOSA Willd Roxb Fl Ind Ed C B C 705**

Vern. — *Pathor mark Pb Khája kassi gauli HIND Kharaka kaka KOL Karika BHUMIJ Kanj kaji KHARWAR Ku MONGHYR, Kadru pala SANTAL Lamkana AJMERE Gauli GARHWAL Angnera BANSWARA, Lamkana angnera RAJPUTANA Geio NEPAL Pengyi LEPCHA Nanda RAJBANSHI Katakuchi MECHI Kashi GARO Kamkui CHITTAGONG, Kasi kosi URIYA Mullu-vengay kamanji TAM Koramánu pedda-anem danki bura dudi maddi koramadi duriyamaddi TEL Kassei GOND Karka KURKU Gunjan kati ain asána MAR BHIL Phatarphod assana asauna BOMB Sun DUK Asuna goji KAN Adamarathu TINNEVELLY Tserchye seikgyi tseikchy seikhe BURM Katta kaala kat takaala SINGH*

Habitat — A large deciduous tree with thorns on the bark of the young stems found in the Sub Himálayan tract from the Chenab eastwards ascending to 3 600 feet in Oudh Bengal Central and South India and in Burma

Botanic Diagnosis — Branchlets and under side of the leaves tomentose bracteoles few, coriaceous Lateral nerves 15 20 pairs calyx slightly enlarged in fruit. (*Brandis*)

Dye — The bark is used in tanning

Medicine — The bark possesses medicinal properties similar to those of the preceding

§ Used as a liniment with gingelly oil in rheumatism (*Surgeon Major J J L Ratton M D Salem*)

Food — The sweetish fruit is eaten especially by wild pigeons The leaves are cut to feed cattle and are said to free them from worms

Structure of the Wood — Sapwood small heartwood grey to olive brown close grained durable seasons well and is moderately hard the annual rings marked by concentric lines It has a mottled grain and takes a beautiful polish

It is used for cattle-yokes agricultural implements carts and building It stands well under water and is accordingly used for well curbs

873

B stipularis, Bl Gamble's Man Timb 356

Syn. — **B SCANDENS Roxb Fl Ind Ed C B C 706**

Vern. — *Gourkassi URIYA Madlatáh, undergápa OUDH Lálma NEPAL Dankibura, sri anem or chri anem TEL Kihur koki, ASS Harinhara BENG ; Sin ma-no-pyin, BURM*

Habitat. — A large straggling or climbing shrub met with in the Sub-Himálayan tract from the Jumna to Surba ascending to altitude 2,000 feet abundant in the Oudh forests also in Bengal Burma, South India, the Malayan Peninsula and Ceylon

Botanic Diagnosis — "Branchlets and under side of the leaves tomentose

B. 873**DYE**
869
MEDICINE
870**FOOD**
871
TIMBER
872

| Grass. | BROMUS arvensis |
|--|---------------------------------------|
| <p>tose bracteoles few coriaceous Lateral nerves 8 12 pair Calyx much enlarged in fruit (<i>Brandis</i>)</p> <p>Structure of the Wood—Greyish brown moderately hard It is used for fuel in the Sunderbans</p> | <p>TIMBER. 874 875</p> |
| <p>Briedelia tomentosa, <i>Bl</i> <i>Gamble s Man Timb</i> 357</p> <p>Syn—<i>B LANCEÆFOLIA</i> Roxb <i>Fl Ind Ed C B C</i> 706</p> <p>Vern.—<i>Sibri</i> NEPAL <i>Mantet</i> LEPCHA <i>Sivas mindri</i> BENG</p> <p>Habitat—A small evergreen tree met with in North East Himālaya ascending to 2 000 feet in Eastern Bengal and in Burma</p> <p>Botanic Diagnosis.—Young branchlets pubescent or tomentose Leaves small glaucous sparingly and minutely pubescent beneath</p> <p>Structure of the Wood—Light olive brown hard close grained</p> <p>Weight 64 lbs per cubic foot</p> | <p>TIMBER. 876</p> |
| <p>Brinjal, see <i>Solanum Melongena</i> <i>Linn</i></p> | |
| <p>Brocoli, see <i>Brassica (oleracea) botrytis</i></p> | |
| <p>BROMELIACEÆ</p> | |
| <p>A Natural Order of monocotyledons in which the ovary is generally inferior occasionally only half inferior and sometimes even altogether superior They belong to the Cohort AMOMALES Flowers distinct and hermaphrodite regular with a 2 seriate perianth Calyx 3 green the two posterior coherent corolla 3 coloured coherent and usually furnished with a nectariferous crest, spirally twisted in æstivation or rarely valvate marcescent and again twisted with age Stamens all perfect epigynous perigynous or hypogynous filaments subulate and usually dilated at the base free or connate and more or less adnate to the inner perianth segments (corolla) anthers introrse 2 celled basi or dors; fixed erect or incumbent</p> <p><i>Ovary</i> from position of the stamens must of course be completely inferior (in the Tribe BROMELIÆ <i>eg</i> <i>Ananas</i> &c) half inferior or superior (in Tribes PITCAIRNIÆ and TILLANDSIÆ) Ovules anatropous numerous 2 seriate at the inner angle of the cells horizontal or ascending rarely definite and pendulous from the top of the inner angle (<i>Ananas</i>) <i>Fruit</i> a 3 celled berry or a cepticidally 3 valved capsule rarely loculicidal Sometimes as in the pine apple the individual fruits are coalesced into a succulent infructescence crowned with a tuft of leaves <i>Seeds</i> usually numerous albumen farinaceous with the embryo outside</p> | <p>877</p> |
| <p>The BROMELIACEÆ are all tropical American and often epiphytic plants In point of structure they are intermediate between the monocotyledon with a free and those with an adherent ovary</p> | |
| <p>As far as India is concerned they are of little or no value except the pine apple which is perhaps one of our most valuable fruits and the fibre of which seems to have a good future before it (see <i>Ananas</i>)</p> | |
| <p>BROMUS, <i>Linn Gen Pl, III</i> 1200</p> | |
| <p>A genus of grasses containing about 40 species chiefly natives of the temperate regions</p> <p>Sheath of leaf cut half way down <i>Glumes</i> unequal, herbaceous many flowered lower 1-veined upper 3 5 veined <i>Flowers</i> lanceolate-compressed lower pale with a long awn (usually) founded on three veins from below the tip <i>Styles</i> below the top of the ovary Nut furrowed adhering to the pales</p> | <p>878</p> |
| <p>Bromus arvensis, <i>Linn Duthie s Grasses, 42</i>; GRAMINEÆ</p> | |
| <p>Syn.—<i>B VERSICOLOR</i> Poll <i>B MULTIFLORUS</i> Host <i>SERRAFALCS AR VENSIS</i> <i>Pari</i></p> | <p>FODDER. 879</p> |
| <p>Habitat.—The North-West Himālaya</p> | |

BROUSSONETIA
papyrifera.**Paper-Mulberry**

880

Bromus asper, *Linn Duthie's Grasses 42*

HAIRY STALKED BROME GRASS

Syn — *B RAMOSUS Huds B MONTANUS Poll , B HIRSUTUS Cart*
*FESTUCA ASPERA Mert and Koch***Habitat** — A perennial grass found in North West Himalaya**Botanic Diagnosis** — Leaves broad hairy Panicle drooping with long slightly divided branches spikelets lanceolate flowers remote, linear lanceolate lower pale hairy 5 7 ribbed lower flower twice the length of the upper glume and longer than its awn**Fodder** — A good fodder grass for tracts sheltered by woods

FODDER

881

FODDER

882

B Schraderi, *Kunth Mueller, Extra Trop Pl, 53*

PRAIRIE GRASS OF AUSTRALIA

Syn — *CEROTOCHLOA PENDULA Schrad*Recently introduced for trial cultivation in the Botanical Gardens at Saharunpur and elsewhere **Mr Duthie** remarks **Mueller** describes this as one of the richest of all grasses growing continuously and spreading readily from seeds particularly on fertile and somewhat humid soil**Broom**, see *Cytisus scoparius*, *Linn LEGUMINOSÆ*

883

BROUSSONETIA, *Vent Gen Pl III, 361*A genus of trees with milky or opaline juice containing 2 or 3 species belonging to the Natural Order *URTICACEÆ* and the Tribe *MORÆÆ* natives of the Malaya China and Japan*Leaves* alternate (in *B papyrifera* sometimes almost opposite) simple petiolate ovate dentate or when young 3 5 lobed upper surface rough under surface soft tomentose penniveined or at the base 3 costate stipules lateral membranaceous and deciduous Inflorescence axillary male in cylindrical catkins female in compact tomentose round heads with a greatly swollen receptacle bracts interposed truncate or clavate at the apex *Flowers* dioecious (very much resembling those of *Morus*) *Male perianth* of 4 segments free or connate at the base membranous valvate Stamens 4 coiled up in bud expanding with elasticity when mature *Ovary* small rudimentary *Female perianth* ovoid or tubular at the mouth 3 4 dentate *Ovary* included within the tubular perianth stipitate 1 locular style subulate entire (not bifid as in *Morus*) *Fruit* stipitate girt at the base with the persistent perianth drupaceous (in *Morus* the succulent sepals constitute the nutritious substance) mesocarp thin except at the base and margins where it is thick succulent and edible forming a forceps like band which assists to eject the ripe seed *Seed* solitary finally separating from the endocarp embryo incurved subequal oblong radicle accumbent ascending albumen fleshy and thick a layer protruded between the folds of the embryoThe genus is named in honour of **P N V Broussonet**, a naturalist who published in 1782 an account of the fishes of Barbary**Broussonetia papyrifera**, *Vent Kurz, For Fl, Burm, II, 467, URTICACEÆ*

THE PAPER MULBERRY OF TAPA CLOTH

Vern. — *Malaing BURM ; Aka kowso kename kowso JAPAN***Habitat.** — A small tree, native of Japan, China, Polynesia, Siam, and said also to be wild in the Martaban hills**Fibre** — The Japanese make paper from the bark of this tree, and the Burmese their curious papier maché school slates (*Parabask*) The Tapa-cloth of the South Sea Islands is made from it, also the Karens' mulberry paper cloth

FIBRE

884

Paper

885

Burmese

slates

886

Tapa-cloth

887

Karen

Paper-cloth

888

B 888

A Valuable Paper Material

**BROUSSONETIA
papyrifera.****FIBRE.**

Perhaps no fibrous plant deserves to be more carefully investigated than this. Much time has apparently been wasted with experiments upon bamboo and rhea. It is probable that in both cases the experiments would have been much more profitable had they been directed to this fibre with the view of discovering how far the paper mulberry could economically be cultivated both as a paper supply and as a new textile fibre. The Agricultural Department of India during 1883 sent consignments of the seeds of this plant to British Burma. Plants were raised successfully and are reported (1884) to be growing vigorously. An attempt made during the rainy season to test the coppicing power of the plants at the Forest Garden of Tharawaddy was so successful that the portion coppiced could only be detected from the rest of the plantation by a close examination of the stools. Dr King in his annual report on the Botanical Gardens Calcutta for 1883-84 writes: "Some months ago I cut some branches of a paper mulberry tree (*Broussonetia papyrifera*) two years old and had the bark removed. The latter was reported on by a paper maker and pronounced as I expected an admirable paper material. Experience in this garden has already proved that this tree grows easily and rapidly in Lower Bengal and I am assured by Mr. Maries Superintendent of the Gardens of His Highness the Maharajah of Durbhunga that it also grows well at Durbhunga—a much drier part of the province. If therefore villagers would take to growing this tree by the borders of their gardens and in the odd corners and scraps of ground in which Bengal abounds there is a reasonable prospect that the province might produce in quantity one of the very best paper fibres known—a fibre at once strong and fine and that has the great merit of requiring very little bleach. With the view of extending the cultivation of this tree I am having thousands of young plants prepared for issue and for planting out in blank spots along the garden boundary."

The Japanese are reported to propagate the plant very much as willows are grown in England. They use only the young shoots for the manufacture of paper. The stems are lopped into convenient pieces and boiled until the bark separates from the wood. The dried bark is next moistened by soaking for a few hours in water. It is then scraped to remove superfluous matter and thereafter boiled in wood ashes until the fibres are thoroughly separated. After the boiling has been completed the fibre is beaten with wooden mallets until it is reduced to a paper pulp (*Royle Fibrous I' 342*). Royle points out that the process of paper making described by Empfer, as practised in Japan so closely resembles the Nepal paper making as to suggest that the practice was introduced to India through China.

The tapa or kapa paper mulberry cloth already alluded to is in the South Sea Islands prepared in a somewhat similar way from the bark of this plant. The bark is soaked for a considerable time until it separates from the wood. It is then beaten out to the required degree of thinness. Mucilage from arrowroot is sometimes used both to join the pieces together and to give adhesiveness to the fabric. This is cut up into garments which are either worn plain or variously coloured and printed.

PROSPECTS AS A PAPER MATERIAL

Both as a future textile fibre and for the manufacture of paper this is perhaps one of the most valuable fibres not at present being used by European commerce. In the Kew Report 1879, p. 33, interesting information is given regarding this fibre. A sample of the bark which came into the hands of Mr. Routledge is stated by him to be 'nearly, if not

BROUSSONETIA
papyrifera**Paper-Mulberry****Paper**
Material
889**890**

quite the best fibre I have seen I must admit it is even superior to bamboo It requires very little chemicals and gives an excellent yield—62·5 per cent in the grey *i.e.* merely boiled, and 58 per cent bleached All this has been urged over and over again but still the fibre does not take its true place In a correspondence regarding bamboo as a supply for paper Dr Brandis expressed his opinion strongly in favour of paper mulberry rather than bamboo From a conviction that it would yet come to be appreciated, and in consideration of its slow growth, he recommended that a certain number of seedlings of the paper mulberry should be planted out every year in the forests where it could be grown especially in Burma The silk worm can be fed upon the leaves of this plant and the annual prunings of twigs to obtain a fresh flush of leaves for the silk worm might be made to give a profitable return as a paper fibre

Cultivation—The following useful account of the propagation of the paper mulberry as practised in Japan may be republished here It is propagated by layering division of roots, cuttings, and by sowings, but the last method is slow and not usually practised

Layering—In the latter part of March the ground is dug around the plant light manure is applied and the young twigs are then layered down in the ground which has been previously dug They are then covered with earth three inches thick, leaving only the tops of the twigs out of the ground In the following spring, when small roots grow from the twigs the layers are cut and planted in prepared ground on small mounds about 18 inches apart, from which new shoots sprout in about ten days after planting By September they often have reached a height of three feet

Propagation by division of the roots—After the twigs have been cut for pulp some of the mounds on which grow suitable plants for propagation during the next year are deeply covered with earth and in the next spring season new shoots sprout from the hill They are then taken up and the roots separated and planted in the nursery ground and after three years they are transplanted to the fixed ground or field and are fit for cutting after another year

Method of planting and cultivation—The young plants may be planted on high ground on mounds or in fields in March or April In June they must be carefully weeded the dry weeds being piled around each mound on which the plants are growing for they make a good manure

The harvesting of the plants may take place any time during the season when the plants are deciduous (from September to February) The manner in which they are prepared for pulping is the same as for mulberry plants as usually practised in Japan and the average amount of the annual harvest of pulp has not yet been ascertained, as it differs considerably in different provinces

There are eleven or twelve varieties of the plant besides which there are five varieties of the wild species which are used for making paper of the inferior quality The *Broussonetia Kazinoki* and *B. Kämpferi* also belong to the same genus (*Indian Forester* Vol VIII p 48)

§ "Paper Mulberry (*Broussonetia papyrifera*)—A packet of the seed of this useful plant was received from Dr King, Director of the Calcutta Botanical Gardens in October last. The seed was at once sown in pots and it germinated freely The seedlings were kept in the seed pots until this spring when they were transplanted into nurseries There are at present 1240 plants in a healthy and thriving condition This climate seems to be very suitable for them Not a single seedling that germinated has died, either from the effects of cold, damp, or in the process of transplanting The same can very seldom be said about many of our

Mangrove Bark

BRUGUIERA
gymnorhiza

common timber trees Being such an easily raised tree and so useful a one I think I should not be wrong in recommending it to the attention of any person who may be in a position to extend its cultivation in Upper India (*Annual Report Botanic Gardens Saharanpur 1881 82*)

'The seedlings alluded to in my last report have done remarkably well Should it ever be under consideration to cultivate this plant on a large scale I can safely say that there need be no anxiety as to its not thriving to perfection in this climate It is easily cultivated both by seed and from cuttings Several of the plants are already in fruit (*Annual Report on Saharanpur Garden for 1882 83 Mr J F Duthie*)

Structure of the Wood—Light coloured even grained not hard nor heavy

BROWNLOWIA, Roxb Gen Pl 1 231

A genus of lofty trees belonging to the Natural Order TILIACÆ it comprises three species confined to tropical Asia

Whole plant stellately pubescent or scaly *Leaves* entire 3 5 nerved *Flowers* numerous small in large terminal or axillary panicles *Calyx* bell shaped irregularly 3 5 fid *Petals* 5 without gland *Stamens* many free springing from a raised torus *Staminodes* 5 within the stamens opposite the petals and petaloid *Anthers* sub-globose *Ovary* celled each cell 2 ovulate styles awl shaped slightly coherent ovules ascending *Carpels* ultimately nearly free 2 valved 1-seeded *Albumen* none cotyl dons thick fleshy

Brownlowia elata, Roxb Fl Br Ind I 381 Bot Reg t 1472

Syn—HUMEA BIATA Roxb Fl Ind Ed CBC 448

Vern—Masjot CHITTAGONG

Habitat—A lofty tree of the tidal forests of Chittagong and Tenasserim

B lanceolata, Benth, Fl Br Ind I 381

Habitat—A tree of the tidal forests of the Sunderbuns Arracan and Tenasserim

B peltata, Benth Kurz, For Fl Burm, I 153

Habitat—A small tree of Tenasserim

Brucea Nima(?) quassioides, Ham, see Picrasma quassioides Benth, SIMARUBÆ**BRUGUIERA, Lam Gen Pl I 679**

A genus of trees belonging to the RHIZOPHOREÆ comprising some eight species natives of the tropics of the Old World

Leaves opposite coriaceous oblong entire stipulate peduncles axillary recurved one to many flowered *Calyx* 8 14 merous adnate to the base of the ovary *Petals* 8 14 oblong 2 fid appendiculate embracing the stamens which spring elastically from them when mature *Stamens* 16-28 filaments filiform anthers linear mucronate about as long as the filaments *Ovary* 2 4 celled included in the calyx tube cells 2 ovuled style filiform stigma 2 4 lobed minute *Fruit* turbinate coriaceous crowned with the calyx limb 1 celled and 1 seeded

Bruguiera gymnorhiza, Lam Fl Br Ind II, 437, RHIZOPHOREÆ

One of the forms of the MANGROVE

Syn—B RHEEDII Bl (*Beddome c*) RHIZOPHORA GYMNORHIZA; Roxb, Fl Ind Ed CBC 390

Vern—Kakra kankra BENG Byubo BURM

Habitat—A small evergreen tree of the shores and tidal creeks of India, Burma and the Andaman Islands

TIMBER
891
892

893

TIMBER.
894

TIMBER.
895

TIMBER
896

897

898

BRYONIA
laciniosa**The Bryony**

TAN & DYE.
Mangrove
Bark.
800
TIMBER.
900

Tan.—The bark is valuable and with *Rhizophora mucronata*, Lam., constitutes the tan known commercially as Mangrove bark (which see)

It is a useful astringent used also in dyeing black

Structure of the Wood—Heartwood small, red, extremely hard
Weight 54 lbs per cubic foot

Used for firewood house-posts, planks and articles of native furniture

901

BRUNELLA, Linn Gen Pl, II, 1203

A genus of perennial procumbent herbs belonging to the LABIATÆ there are 2 to 3 species natives of the temperate regions

Leaves entire or inciso-dentate or even pinnatifid. *Flowers* 6 in a whorl forming a dense terminal spike with two broad kidney shaped bracts under each whorl. *Calyx* reddish purple ultimately closed and compressed upper lip flat truncate 3 toothed lower bifid. *Corolla* ringent upper lip concave entire. Two inferior stamens the longest anthers all 2-celled filaments bifid one branch barren

902

Brunella (Prunella) vulgaris, Linn

SELF HEAL

Vern—*Austakhadus* PB *Ustukhudus* SIND

Habitat—A small branched erect or creeping herb of the Himálaya from 3 000 to 10 000 feet

Medicine—Regarded an expectorant and antispasmodic

§ The green leaves smeared with castor oil and warmed over the fire are applied externally to the anus in cases of painful piles (*Surgeon Major Thompson M D Madras*)

MEDICINE
903

Brussels sprout, see *Brassica (oleracea) gemmifera*.

904

BRYONIA, Linn Gen Pl, I, 829

A genus of climbing herbs belonging to the Natural Order CUCURBITACEÆ There are in all 12 species inhabitants of the warm and temperate zones of the Old World

Climbing herbs scabrid and glabrous tendrils 2 fid in the Indian species *Leaves* petioled palmately 5 lobed or 3 5 angular *Flowers* small yellowish males and females clustered in the same axils (in the Indian species shortly pedicelled) **MALE** calyx tube widely campanulate 5 toothed corolla 5 partite stamens 3 inserted low down the calyx tube anthers free two 2-celled one 1 celled cells curved or somewhat sigmoid never quite conduplicate connective not produced rudiment of ovary 0 **FEMALE** calyx and corolla as in the male ovary ovoid style slender 3 fid at the top no disc at the base in the Indian species ovules many horizontal placentas 3 *Berry* spherical indehiscent *Seeds* not very many oblong or ovoid compressed

The generic name *Bryonia* from *βρῠωνία* and *βρῠωνή*=to be full of or to swell

Bryonia callosa, Rotll, syn for *Cucumis trigonus* Roxb which see

B epigæa, Rotll, see *Corallocarpus epigæa*, Hook f

B laciniosa, Linn Fl Br Ind II, 623 Wight, Ic t 500

THE BRYONY

Vern—*Gargu-naru* HIND *Mala* BENG *Kawale-che-dole* BOMB
Nehoemaka MAL *Linga-donda* TEL

Habitat—Throughout India from the Himalaya to Ceylon

Medicine—‘The whole plant is collected when in fruit for medicinal use. It is bitter and aperient and is considered to have tonic properties’ (*Dymock*) Used as a medicine by the Santals

Food—The leaves are boiled and eaten as greens

MEDICINE.
905
FOOD
906

R 006

The Buchanania.

BUCHANANIA.

Bryonia pilosa, Roxb *Fl Ind*, III, 726, and

B *rostrata*, Rottl, syn for *Rhynchoscarpa foetida*, Schrad
Vern — Kunkuma donda naga-donda TEL

B *scabrella*, Linn *f* see *Mukia scabrella*, Arn

B *umbellata*, Wall see *Trichosanthes cucumerina*, Linn

BRYOPHYLLUM, Salisb *Gen Pl* I 658

A genus of herbaceous perennials belonging to the CRASSULACEÆ there are 4 species in tropical Africa one of which extends throughout the tropical regions of the whole world

Tall erect herbs *Leaves* opposite crenate *Flowers* large pendent in spreading panicles with opposite branches *Calyx* with a long inflated tube lobes 4 short valvate *Corolla* with a campanulate tube and shortly 4 fid limb *Stamens* 8 in two series inserted on the middle of the corolla tube *Hypogynous scales* 4 obtuse *Carpels* 4 free or connate at the base attenuated into long styles *ovules* numerous *Follicles* 4 many-seeded

The generic word is derived from *βρυω* to be full of, or to burst forth, and *φυλλον* a leaf in allusion to the succulent nature of the leaves and probably also because the leaves have the power of rooting by buds produced in the serrations on the margin of the leaves

Bryophyllum calycinum, Salisb *Fl Br Ind*, II 413

Syn — KALANCHOF PINNATA Pers COTYLEDON RHIZOPHYLLA Roxb

Vern — Kôp patu BENG *Ahiravana mahiravana ghayamari* BOMB CUTCH The Mohammedans call it *Zakhm haiyat* PERS HIND *Zakhm haiyat ka pattu* DJK *Malai kalli runa kalli* TAM *Sima jamudu* TEL *Ela maruvina elamarunga mur kuti* MALA *Lonna hadavana gida* KAN *Yoe kiya pin bu* BURM

Habitat — A succulent plant with thick fleshy leave from the crenulations of which in contact with the ground bulbules are produced which develop into new plants Common throughout Bengal and the hotter moist parts of India to Ceylon and Malacca

History — According to Roxburgh this plant was introduced into the Calcutta Botanic Gardens from the Moluccas Voigt adds that it was brought by Lady Clive in 1799 As already stated it is now found nearly over the greater part of the hot moist parts of India In Lower Bengal it is one of the most abundant of gregarious herbs and it has even spread through Assam and Sylhet to the valley of Manipur It is met with in fact throughout India although less abundantly than in Bengal Dr Dymock appears to regard it as a native of the Deccan and of the Konkan but the *Bombay Flora* (Dalz and Gibs 1861) gives it as merely common in the Warree country and near Belgaum

Medicine — The leaves slightly toasted are used by the natives as an application to wounds bruises boils and bites of venomous insects I have seen decidedly beneficial effects follow their application to contused wounds swelling and discoloration were prevented and union of the cut parts took place much more rapidly than it does with ordinary treatment by water dressing (Dymock p 297)

§ Used in the form of poultice and powder for sloughing ulcers, it is a disinfectant (Surgeon W Barren Bhuj Cutch)

BUCHANANIA, Roxb *Gen Pl*, I, 421

A genus of trees belonging to the Natural Order ANACARDIACEÆ there are some 20 species, natives of tropical Asia, Australia and the Pacific Islands

B. 912

907

908

909

910

MEDICINE.
Leaves.
911

912

BUCHANANIA
latifolia**The Chironji**

Leaves alternate petioled simple quite entire *Panicles* terminal and axillary crowded *Flowers* small, white hermaphrodite *Calyx* short, 3-5 toothed or lobed persistent, imbricate *Petals* 4-5 oblong recurved imbricate *Disk* orbicular 5 lobed *Stamens* 8-10 free inserted at the base of the disk *Carpels* 5-6 free seated in the cavity of the disk, one fertile the rest imperfect style short stigma truncate ovule 1 pendulous from a basal funicle *Drupe* small flesh scanty stone crustaceous or bony 2 valved *Seed* gibbous, acute at one end cotyledons thick radicle superior

The genus is named in honour of the late distinguished Indian botanist Dr Buchanan Hamilton

913

Buchanania latifolia, Roxb *Fl Br Ind* II, 23

Vern — *Piyar piyál piyála chirónji* (the kernel) HIND *Chirónji* (the fruit) *piyal* BENG *Chirauli* (the fruit) *chironji* PB *Piál payala murá katbhilawa* GARHWAL *Piar peira pérrah* OUDH *Tarum KOL* *Piál BHUMIJ* *Peeá KHWAR* *Taróp SANTAL* *Charu URIYA* *Achar char chirónji* (the fruit) C P *Saraka herka* GOND *Taro KURKU* *Sir BHIL* *Char ki charóli* (the kernel) DUK *Pizal charóli* BOMB *Charwari* HYDERABAD *Mowda* or *katimango marum kat maa asma katma maram* (the plant) *katma-payam* or *katma param* (the fruit) *kátma-parpu* (the kernel) TAM *Chara charu mamudi chinna mora morli chara chettu* or *sára chettu chara mamudi jaru mamudi* (the plant) *chara-pandu* (the fruit) *chára puppu* (the kernel) TEI *Nuskul murkalu* KAN *Kala maram* MALA *Charóli* GUJ *CUTCH* *Pyal char* MAR *Piyala chura chirika* SANS *Lonepho lundo lamboben lambo* or *lon po loneopomaa* BURM

References — *Roxb Fl Ind Ed C B C* 365 *Voigt* 272, *Brandis For Fl* 127 *Gamble Man Timb* 100 *Kurz For Fl Burm* I 307 *Beddome t* 165 *Dals and Gibs Bomb Fl* 52, *Stewart's Pb Pl* 45 *Lisboa's Useful Pl Bomb* 53 *Drury's Us Pl Ind* 88

Habitat — A tree leafless only for a very short time Found in the Sub-Himálayan tract from the Sutlej eastward ascending to 2 000 feet throughout India and Burma common in the hotter and drier parts of the empire and frequently associated with the *sál* the *mahua* and the *dak*

Properties and Uses —

GUM
914

Gum — A pellucid gum exudes from wounds on the stem (*Brandis*) more than half soluble in water and is reported to resemble *Bassora Gum* (See *Bassora* and also *Cochlospermum*.) It occurs in irregular broken fragments brittle pale horn coloured tinged with brown tasteless soluble in water except a small insoluble portion of basorine It has been pronounced as having adhesive properties similar to the inferior kinds of gum arabic and as suitable for dressing textiles The bark and the fruits furnish a natural varnish

VARNISH
915TAN
BARK
916
OIL
917

Tan — The bark is used in tanning

Oil — The kernels of the fruit yield an oil called *Chironji* but owing to their being so much prized as a sweetmeat when cooked this oil is rarely prepared It is pale straw coloured limpid sweet and wholesome The kernels when broken readily yield this oil, 50 per cent being obtained (*Agri Hort Soc Four Ind XII* 346)

MEDICINE
Gum
918
Oil
919

Medicine — The gum is said to be administered in diarrhoea The oil is used as a substitute for almond oil in native medicinal preparations and confectionery It is also applied to glandular swellings of the neck According to *Dr Irvine (Medical Topography, Ajmir 131)* the seed is very palatable and nutritious especially when roasted is used also in medicine and is considered heating The fresh fruit is very agreeable

Special Opinions — § The fruits are said to be sweet and laxative They are used to relieve thirst, burning of the body and fever' (*Dr U C Dutt Serampore*) 'Used to improve the flavour of drugs in general' (*Surgeon W Barren, Bhuj Cutch*)

B 919

The Buddleia.

BUDDLEIA

Food — The kernel is a common substitute for almonds amongst the natives. It is largely used in sweetmeats. Its flavour is described as between that of the pistachio and the almond. It is eaten roasted with milk (*Lisboa Useful Plants of the Bombay Presidency* p. 50).

The FRUIT is eaten by the hill tribes of Central India. Having first pounded them along with the contained kernels they dry them in the sun. As required this is baked into a sort of bread and eaten.

The forest tribes gather the seed and take out the kernel which they exchange for grain salt and cloth. The kernel is an important article of trade being largely used in native sweetmeats. Oil is also extracted from it (*Bomb Gaz VII* 37).

§ The fruit is sold in Bombay under the name of *chára bhur* (*Surgeon Major W Dymock Bombay*).

Fodder — The LEAVES are said to be given as fodder (*Bomb Gaz X* 403).

Structure of the Wood — Greyish brown moderately hard with a small dark coloured heartwood. It seasons well and is fairly durable if kept dry. Weight 30 to 36 lbs per cubic foot.

The wood seasons well is easily worked and if kept dry is fairly durable (*Bomb Gaz VII* 27). The heartwood is hard but the rest of the wood is poor. A seasoned cubic foot weighs 36 pounds (*Bomb Gaz XV* 64).

It is used for boxes bedsteads bullock yokes doors window frames tables &c

FOOD
Kernel
920

Fruit
921
Prepared
bread
922

FODDER
Leaves
923
TIMBER
924

BUCKLANDIA, *Br Gen Pl I* 668

925

A tree attaining a height of 90 feet. *Leaves* alternate cordate-ovate acuminate entire long petioled stipules solitary or in pairs large oblong coriaceous deciduous. *Inflorescence* of 25 peduncled heads at first enclosed between a pair of stipules flowers adnate by their calyces about 8 in a head polygamous. *Calyx* tube adnate to the ovary limb 5 lobed. *Petals* in the ♂ flower linear spatulate fleshy variable in number in the ♀ rudimentary. *Stamens* 10-14 (in the ♀ none) filaments long. *Ovary* half inferior 2 celled styles 2 separate soon divergent. *Ovules* 6 in each cell in two rows. *Capsule* nearly superior woody subglobose endocarp horny showing a tendency to separate from the exocarp. *Seed* 6 in each cell oblong trigonous the upper wingless solid without any embryo the lower one in each cell winged and fertile.

Bucklandia populnea, *R Br Fl Br Ind II* 429 HAMAMELIDÆ

926

Vern — *Pipli* NEPAL *Singliang* LEPCHA *Dingdah* KHASIA

Habitat — A large evergreen tree met with in the Eastern Himalaya Khasia Hills and hills of Martaban from 3000 to 8000 feet.

Structure of the Wood — Greyish brown rough moderately hard close grained durable. Is very much used in Darjiling for planking and for door and window frames.

TIMBER
927

Buckthorn, see *Rhamnus catharticus*, *Linn RHAMNÆ*

Buck-wheat or Brauk, see *Fagopyrum esculentum*, *Mæench*

BUDDLEIA, *Linn Gen Pl, II* 793

928

A genus of LOGANIACEÆ comprising some 70 species natives of the tropical and sub-tropical regions of Asia America and Africa.

Trees shrubs or herbs. *Leaves* opposite entire or crenate united by a stipular line. *Cymes* dense globose or corymbiform axillary or in a thyrsoid terminal panicle. *Calyx* campanulate 4 merous. *Corolla* urn shaped lobes 4 imbricate in bud. *Stamens* 4 on the corolla tube anthers subsessile.

BUPLEURUM

The Hare's ear

ovate or oblong Ovary celled style linear clavate ovules very many in each cell Capsule septicidally 2 valved Seed numerous oblong or fusiform testa usually loose or expanded into a wing or tail albumen fleshy embryo straight

A genus named after Adam Buddle a British botanist of some note

929 **Buddleia asiatica**, Lour Fl Br Ind IV 82

Syn — B NEEMDA Buch Roxb Fl Ind Ed C B C 133 Wight
Ic t 894 133

Vern — B ati dhaula shiuntra KUMAON Bana SIMLA INewarpati
NEPAL Pondam LEPCHA Nimda buddhola CHITTAGONG Kyoung
miku BURM

Habitat — A large evergreen shrub of the Sub Himalayan tract from the Indus eastward ascending to 4 000 feet Bengal Burma South India chiefly found in second growth forests deserted village sites and savannahs

TIMBER
930

Structure of the Wood — Grey moderately hard Weight 44 lbs per cubic foot

931 **B Colvillei**, Hook f Fl Br Ind IV, 81

Vern — Puri singbattu NEPAL Pya shing BHUTIA

Habitat — A small tree of the Eastern Himalaya from 9 000 to 12 000 feet

TIMBER
932
933

Structure of the Wood — Reddish brown soft

B paniculata, Wall Fl Br Ind IV 81

Syn — B CRISPA Benth

Vern — Spera una ARG Dholtu ghuttia sodhera sudhari N W
HIMALAYA Sinna NEPAL

Habitat — A large evergreen shrub of the Himalaya from the Indus to Bhutan ascending to 7 000 feet

TIMBER
934

Structure of the Wood — White moderately hard close grained Weight 41 lbs per cubic foot

Buffalo grass or Gama grass, see *Tripsacum dactyloides* (P)

Bullock's heart, see *Annona reticulata*, Linn

935 **BUPLEURUM**, Linn Gen Pl I, 886

A genus of UMBELLIFERÆ comprising some 60 species natives of Europe and temperate Asia It is at once recognised from all its associates by its glabrous and glaucous entire thick leaves

Glabrous herbs or shrubs Leaves entire Umbels compound bracts and bracteoles foliaceous setaceous or o Flowers yellow or lurid pedicelled or subsessile Calyx teeth o Petals obovate emarginate Styles short Fruit laterally compressed slightly constricted at the commissure carpels terete or subpentagonal primary ridges distinct sometimes subulate rarely obscure secondary o or obscure vittæ 1 3 between the primary ridges rarely o or many carpophore entire 2 fid or 2 partite Disc depressed rarely prominent in fruit Seed terete sometimes slightly grooved on the inner face

The generic name is the Greek βουπλευρον—βους (bous) the ox and πλευρον (pleuron) a rib a name which probably indicates a resemblance to the curved lanceolate and entire leaves Latin *Bupleuron* Russ *Bupleur*, It *Bupleuro* and Fr *Bupleure* They are generally known in English as the Hare's ear

B. 935

The Myrrh Family

BURSERACEÆ.

Bupleurum falcatum, Linn var *marginata*, Wall Fl Br Ind II 676

Vern — *Kali sewar sipil* Pb

Habitat — Met with in the mountainous tracts of Northern India from 3 000 to 12 000 feet extending from Kashmir to the Khasia Hills

Medicine — This as also other members of the genus is reputed to have stimulant properties

Food — The root is said to be eaten

936

MEDICINE

937

FOOD

938

939

BURSERACEÆ

Balsamiferous trees or shrubs *Leaves* alternate (ery rarely opposite) imparipinnate or trifoliate (very rarely unifoliate) stipulate or exstipulate *Inflorescence* racemose or paniculate *Flowers* regular small hermaphrodite or often polygamous *Calyx* free 3 6 lobed imbricate or valvate often minute *Petals* 3 6 distinct rarely connate imbricate or valvate *Disk* annular or cupular usually conspicuous free or adnate to the base of the calyx *Stamens* as many or twice as many as petals inserted at the base or margin of the disk equal or unequal filaments free rarely connate at the base smooth anthers dorsifixed rarely adnate 2 locular dehiscent longitudinally *Ovary* free rarely 1 more often 2 5 celled style simple, stigma undivided or 2 5 lobed ovules 2 or rarely 1 in each cell anatropous axile usually pendulous rarely ascending micropyle superior raphe ventral *Fruit* drupaceous indehiscent containing 2 5 pyrenes rarely pseudo-capsular and dehiscent *Seeds* solitary pendulous testa membranous albumen 0 cotyledons usually membranous contortuplicate rarely fleshy and planoconvex radicle superior

Drupe valvately dehiscent pyrene separating

Drupe trigonous

Drupe broadly 3 winged

1 *Boswellia*2 *Tromma*

Drupe indehiscent pyrene not separating

Stamens 6 10—

Calyx 5 fid urceolate Disk clothing tube of calyx

Calyx 4 toothed urceolate Disk cupular
Flowers few fasciculate

3 *Garuga*.4 *Balsamodendron*

Stamens 8 10—

Calyx 4 6-toothed small Disk clothing base of calyx Inflorescence paniculate

Calyx 4 6-lobed imbricate Disk annular

Calyx usually 3 fid valvate Drupe ellipsoid usually trigonous style terminal

Calyx 3 fid valvate Drupe usually gibbous style lateral

Calyx 3 partite large valvate Drupe globose

Stamens 5

5 *Protium*6 *Bursera*7 *Ocimum*8 *Santiria*9 *Trigonochlamys*10 *Filicium*

(Fl Br Ind I 527)

There are about 160 species of Balsamiferous trees and shrubs belonging to this Natural Order in the world all inhabitants of the tropical regions In India there are 39 species referred to 10 genera Of these 34 or 87 2 per cent are confined to the plains 5 or 12 8 per cent ascend to 5 000 feet in altitude and none to higher altitudes Their distribution over India is also striking 28 or 71 8 per cent occur in the eastern division of India the majority being natives of Malacca In South India 2 species occur 2

**BUTEA
frondosa****Bengal Kino**

in North India which also extend to Bombay and another species confined to Sind 5 species are general over the greater part of India

940

BURSERA, Linn Gen Pl I 324

A genus of BURSERACEÆ containing some forty species mostly natives of tropical America

Balsamiferous trees *Leaves* alternate imparipinnate or rarely 1 foliolate *Panicles* short branched *Flowers* hermaphrodite or polygamous *Calyx* small 4-6 partite or toothed imbricate *Petals* 4-6 short patent at length reflexed usually valvate *Disk* annular crenate *Stamens* 8-12 nearly equal inserted at the base of the disk *Ovary* free ovoid or sub globose 3-5 celled style very short stigma 3-5 lobed ovules 2 in each cell *Drupe* globose or ovoid with 3-5 pyrenes

This genus is named after **Joachim Burser** a friend of **Caspar Bauhin** Professor of Botany at Sara Naples

941

Bursera serrata, Wall Fl Br Ind I 530

Syn — *LIMONIA PENTAGYNA* Roxl *Fl Ind Ed C B C 364*

Vern — *Murtenga* ASS *Chitrika* TEL (on the Sircars) *Thad ben* BURM

Habitat — A large evergreen tree of the eastern moist zone of Bengal Assam Chittagong and Burma

TIMBER

942

Structure of the Wood — Hard sapwood light brown heartwood red close-grained Weight 46 lbs per cubic foot

Good for furniture

943

BUTEA, Roxb Gen Pl I 533

An elegant genus of LEGUMINOSÆ with large orange red flowers contain ing three species all Indian

Erect trees or climbing shrubs with 3 foliolate stipellate leaves *Flowers* densely fasciated large showy in axillary racemes or terminal racemes or panicles *Calyx* broadly campanulate teeth short deltoid *Corolla* much exerted petals nearly equal in length the keel much curved sub obtuse or acute *Stamens* diadelphous anthers uniform *Ovary* sessile or stalked 2 ovuled style filiform curved beardless stigma capitate *Pod* firm ligulate splitting round the single apical seed the lowest part indehiscent

A genus named after **John Earl of Bute**

944

Butea frondosa, Roxb Fl Br Ind II 194

BUTEA GUM **BENGAL KINO** sometimes called the **BASTARD TEAK**

Vern — *Dhak palas tesu ka-pér kakria kankrei chichra* HIND *Pal s* BENG *Chalcha* BANDELKHAND *Murut* KOL *Murup* SANTAL *Pharsa* BAIGAS *Paras faras* BEHAR *Palasi bulyettra* NEPAL *Laho kung* LEPCHA *Palashu* MECHI *Porasu* URIYA *Chiula puroha* *palas chintu* C P *Murr* GOND *KURKU* *Palasa khakira khakharo* BOMB *Palas ka-jhar tesu ka-jhar* DUK *Khakaré khakhado khakhar nu jhada* GUJ *Khakar palas* CUTCH *Paras palas phalasa cha jhada kakricha jhada* MAR *Porasan parasa murukkan puraishu purashu pal sham* TAM *Móduga mohtu tella módugu móduga chettu pala-shamu palasamu palasamu kimsukamu motuku palas modaga mar dula* TEL *Muttuga thoras muttaga mara muttuga gidá* KAN *Pluch cha murukka maram* MAL *Kinsuka palasa* SANS *Darakhte palah palah* PERS *Gasskeala or gaskoela calukeale kaliya* SINGH *Pouk pav pin* BURM

Habitat — A moderate sized deciduous tree found throughout India and Burma extending in the North West Himáláya as far as the Jhelum

This is one of the most beautiful trees of the plains and lower hills of India Although many of its properties are much appreciated by the natives it must be admitted that the tree seems comparatively neglected

Bengal Kino

BUTEA
frondosa

A waving well wooded country set thick with bright scarlet flowering apple trees gives some idea of many a Panch Mahal landscape when the *khakhra* is in bloom. In habit of growth it is not unlike the apple tree and the leaves dropping when the flowers come the top and outer branches stand out like sprays of unbroken scarlet. In the bud the dark olive green velvet of the calyx is scarcely less beautiful than the full flower (*Bomb Gas III 199*). Nearly every part of this interesting plant may be put to some useful purpose and a little careful investigation seems all that is necessary to raise the gum at least to the position of an important commercial product.

THE GUM

Gum—It yields naturally or from artificial scars on the bark a gum which is sold as Bengal Kino or *chunia gond*. This occurs in the form of round tears as large as a pea often fragmentary of an intense ruby colour and astringent taste. The gum may be purified by solution in water. It is translucent but with age it darkens and becomes opaque. It is brittle heat rendering it more so instead of melting it. It is generally known as *Kamarkas* in the bazars of the North West Provinces *Khakar gond* in Bombay and *Chunyá gond kinya gond* and *palds ka gond* in Madras and some other places. In native medicine Bengal kino is largely used as an astringent—a substitute for true kino. It is also employed in tanning.

GUM
945

Chemical Composition—An aqueous solution of this gum by the action of persulphate of iron is changed into a dirty green colour a larger quantity occasioning a bright green precipitate. Acids throw down an orange or dirty yellow pigment from the solution. A few drops of caustic potash change the colour to crimson becoming grey with excess until the whole of the colour is destroyed. Similar changes are effected by the action of caustic soda and ammonia. Carbonates of potash and of soda deepen the colour of the solution but not so much as caustic potash. Metallic solutions like acetate of lead precipitate the whole of the colouring matter. Attempts have been made to fix these colours in the fibre of cotton silk wool &c with different mordants but with very unsatisfactory results (*Prof Solly in Journ Royal Asiatic Society 1838 and reproduced in several subsequent publications*). **Roxburgh's** experiments with this gum are of sufficient importance to justify their being reproduced here. This gum held in the flame of a candle swells and burns away slowly without smell or the least flame into a coal and then into fine light white ashes. Held in the mouth it soon dissolves its taste is strongly but simply astringent. Heat does not soften it but rather renders it more brittle. Pure water dissolves it perfectly the solution is of a deep clear red colour. It is in a great measure soluble in spirits but this solution is paler and a little turbid the solution also becomes watery when spirit is added and the spirituous more clear by the addition of water. Diluted vitriolic acids render both solutions turbid and caustic vegetable alkali changes the colour of the watery solution to a clean deep fiery blood red. The spirituous it also deepens but in a less degree. Sal marties changes the watery solution into a good durable ink.

946

Roxburgh pointed out that the Butea kino differs from the true kino in that it is more soluble and the solution more astringent in water than in spirit while it is just the reverse with true kino. This property would thus admit of Butea kino being used where the presence of spirit was objectionable. According to the authors of the *Pharmacographia*.

This substance has a pure astringent taste but no odour. It yielded us 1.8 per cent of ash and contained 13.5 per cent of water. Ether

B 946

**BUTEA
frondosa****Palas Tree****GUM**

removes from it a small quantity of *pyrocatechin*. Boiling alcohol dissolves this kino to the extent of 46 per cent the solution which is but little coloured produces an abundant greyish green precipitate with perchloride of iron and a white one with acetate of lead. It may be hence inferred that a tannic acid probably kino tannic acid constitutes about half the weight of the drug the remainder of which is formed of a soluble mucilaginous substance which we have not isolated in a state of purity (*p* 198)

The Uses of the Gum may be said to be almost confined to medical science. As an astringent drug it is extensively used in India and to a limited extent in Europe also. For industrial purposes the gum has made no progress but there seems a good future for it both as a dye and tan. The natives of India are said to use it to precipitate and purify blue indigo. It is described as one of the best gums of the Central Provinces. In the Bombay Presidency it is said to be specially collected by the Naik dás (*Bomb Gaz III 109*). From wounds in the bark a ruby coloured astringent gum exudes which loses colour by exposure but it may be preserved by the gum being closely confined in a bottle (*Lisboa Useful Plants in the Bombay Presidency 243*). It is almost needless to republish the numerous references to this gum suffice it to say that as the tree occurs throughout India and grows at first rapidly attaining its full size in little more than ten years and requires no special care whatever the supply of the gum and of the other products might be indefinitely extended should necessity arise. The so called gum obtainable in our bazars is an exudation of a gummy sap from incisions on the bark. This hardens on exposure to the air into beautiful red coloured transparent tears which darken and become opaque with age unless kept in air tight bottles. It would be interesting to have the timber of this tree treated in the same manner as in the preparation of Catechu and it seems just possible were this done that a pure tanning extract might be obtained which would prove more suitable for industrial purposes than the gum at present met with in commerce. This is worthy of a trial for if found serviceable the preparation of the extract might be combined with the separation of the bark fibre as a paper material. If at the same time the flowers as a dye stuff could be made to give an additional return Butea cultivation would become a profitable industry.

**LAC
947**

Lac—The lac insect is reared upon this tree in many parts of India—Chutia Nagpur Central Provinces the Deccan Baroda and Gujarát &c. Commercially this is regarded as the second best quality of lac (See **Lac**)

DYE PROPERTIES**DYE
Gum
948
TAN
949**

Dye and Tan—The GUM as already stated may be used both as a dye and tan but except in India it is not in much demand for these purposes and can hardly be viewed as a commercial product. By chemical actions special pigments and dyes may be prepared from it which seems to deserve further and more careful attention (See the account given under **Gum**). As a tan the chief drawback to it seems to be the presence of so much gummy matter and a colouring agent mixed up with the tanning principle the former of which retards its action. The following report by Mr Tiel of an experiment with this gum as a tan is extracted from the *Journal of the Agri Horticultural Society of India Vol VIII 25 for 1851*. A piece of small calfskin after being prepared in the usual way for the reception of tanning was, on the 15th of July immersed in a decoction of the *dhak palás* which was found readily soluble in cold water, the decoction was changed at intervals, as is usual, four times each succession of liquor

The Tesu Dye

**BUTEA
frondosa****TESU DYE.**

being increased in strength to that which preceded it each liquor was found to darken in colour in proportion to the time it was exposed to the action of the atmosphere. The skin during the process was constantly worked and attended to and would with like care have been thoroughly tanned in five days with babul bark. On the 21st July a piece of the skin was cut to dry out to see if it really was tanned and although it was highly coloured *through* and had all the appearance of being thoroughly tanned yet after being well washed as is usual in currying and dried out it became as hard and as unpliable as a raw skin. Although it was highly coloured through little or no tannin had combined with the skin. The tanning process was continued adding gradually as was required more of the substance until the 1st August when another piece of the skin was tried by drying out and with the same result as the first. From thence to the 15th and 25th August respectively when the whole two seers were consumed the remainder of the skin was finally dried out and found to be scarcely one third tanned. It is therefore said to be of no use as a tanning substance but it might perhaps be worthy of attention as a dyeing substance (for its colour seems very fast) or for tanning could its astringent qualities which are considerable be easily deprived of so much colouring and gummy matters.

The FLOWERS called *tesu kesu kesuda* or *palas ké phul* yield a brilliant but fleeting yellow dye much used by the natives of India especially during the *Holi* festival. This is extracted either by expressing the coloured sap of the fresh flowers or as a decoction or infusion from the dried flowers. The old leaves fade in February the flush of new foliage appears in April and May being preceded by a blaze of bright orange flowers which at this season enliven the forests. No exact estimate of the number of trees and therefore of the quantity of flowers which are annually produced can be arrived at but the tree is one of the commonest plants in India all over the drier undulations of the central plateau the supply is practically unlimited. The flowers may be had for the gathering as the annual production far exceeds the demand. They are collected in March and April and as a rule are sun dried. The petals are separated from the rest of the flower and preserved and are in this condition sold or when dry they are sometimes reduced to a powder. Simple immersion in water will extract the colour but in some parts of the country the dye stuff is boiled. The cloth to be dyed is sometimes boiled in the solution without the aid of any auxiliary or mordant. At other times the cloth having been previously prepared by alum lime or ash is then boiled with the colour or again these substances are mixed with the dye stuff and the cloth either boiled in the mixed dye and mordant solution or left to steep in it for some time. The process of extraction of the dye is generally as follows. A given weight of dye is mixed thoroughly with twice as much water. After having been allowed to soak for some time, the mixture is boiled down to half its volume. It is then strained and allowed to cool. The cloth is either immersed in it before it cools or is boiled with a required amount of the dye solution or is steeped in a cold dye solution. The natives as a rule prefer the fleeting but brilliant yellow colour produced without the aid of any auxiliary especially to dye the cloths worn at the *Holi* festival the fact of the colour being fleeting is viewed rather as an advantage than otherwise since it can be got rid of after the festival is over. The addition of an alkali as originally pointed out by the late Dr Roxburgh deepens the colour into orange and makes it at the same time a little less fleeting. Alum lime wood ash or *sajji matti* serves this purpose.

Other vegetable substances are sometimes combined with the *tesu* in the production of yellow dyes of which the following may be mentioned

**Tesu
Flowers
950****Powder
951
Dye
preparation
952****Mordants
953**

**BUTEA
frondosa****Palas Flowers**

Auxillaries
954
Combinations
955

Pigment
956

THE TESU
DYE
Abir
957

IBRE
958

OIL
959

harsinghar (*Nyctanthes Arbor tristis*), *latkan* (*Bixa Orellana*), *al* or *aich* (*Morinda tinctoria*), *haldi* or *turmeric* (*Curcuma longa*) *baqam* (*Cæsalpina Sappan*), *gumbengfong* (*Plecosperrum spinosum*) the last mentioned is regarded specially useful as a silk dye. The presence of the *tesu* seems to improve the brilliancy of these dyes but it is doubtful if its use can be recommended since there seems no idea of its being in these combinations more durable than when used alone. Other vegetable substances are recommended to be combined with it from some idea of their helping to make the colour less fleeting. The following are those most frequently used for this purpose *hari* or *har* (*Terminalia chebula*), *lodh* (*Symplocos racemosa*). It is remarkable how extensively the bark of the last mentioned plant is used in native dyes as an auxiliary intended to brighten and fix the colour. It is probable that the Manipuri dye auxiliary (*Garcinia pedunculata*) might with advantage be added to this list of dye auxiliaries suitable for the *tesu* or *palas* dye. By combination with indigo shades of green and light blue are sometimes produced. A grape green *tesu har singhar* and indigo with acidulated water are used. To give light blue (the *lajwari* colour of Cawnpore) *tesu* alum talc and indigo are used (*Mr Buck Dyes and Tans of N W P*)

A PIGMENT—**Dr Roxburgh** appears to be the only person who has experimented with a pigment extracted from these flowers. He says

Amongst numberless experiments I expressed a quantity of the juice of the fresh flowers which was diluted with alum water and rendered perfectly clear by depuration. It was then evaporated by the heat of the sun into a soft extract this proves a brighter water colour than any gamboge I have met with. It is now one year since I first used it and it remains bright.

Infusions of the dried flowers yielded me an extract very little if anything inferior to this last mentioned. They yield also a very fine durable yellow lake and all these in a very large proportion. (*Roxb Fl Ind Ed C B C 540*)

An **ABIR**—**Voigt** says that the yellow dye obtained from the *tesu* flowers is used at the *Holi* festival. This same fact is alluded to by several writers but without describing the particular way in which it is used. Under the heading **ABIR** will be found some further information from which it will be seen that it serves as *gula* for the flour of the singara nut but I am unable to discover the exact preparation which is used—*e g* a dry pigment or simply a powder of the petals mixed with the flour or whether the decoction of the petals or a dye solution is mixed with the flour just as it is being used. Probably in different parts of the country all three practices are followed.

Dr Buchanan (in his *Statistical Account of Dinajpur*) says of this tree. The flowers are not only offered to the gods but in the festivals of spring serve to give a temporary yellow dye to the clothes of their votaries on which account it is called *Vosonti*.

FIBRE

Fibre—Yields a strong fibre said to be useful for paper making and for cordage also the young roots yield a strong fibre known as *chhoel*. This is made into ropes in Chutia Nagpur Central Provinces Oudh Rájputana and Bombay hill tracts &c it is also used in some parts of India for making native sandals.

Oil—The seeds of this tree (*palas pápra* of the bazar) yield a small quantity of bright clear oil (by some authors called *Muduga* oil) this is sometimes used medicinally.

The Dak or Palas.

BUTEA
frondosa

MEDICINE

Medicine—**THE GUM**—This is known as Bengal or Butea kino. Nearly the whole of the so-called kino of our bazars is this substance. **Dr Waring** (in his *Bazar Medicines* p 31) remarks that this is of little moment since it appears to be equally effectual. He says it is an excellent astringent similar to Catechu but being mild in operation it is better adapted for children and delicate females. The dose of the powdered gum is 10 to 30 grains with a few grains of cinnamon. The addition of a little opium increases the efficacy.

THE IRISH JUICE is used in phthisis and hemorrhagic affections. It is also employed as an application to ulcers and relaxed sore throat. As an astringent it is given in diarrhoea and dyspepsia. In the Konkan it is prescribed for fevers. The use of the gum as an external astringent application is mentioned by **Chakradatta**. It is directed to be combined with other astringents and rock salt. He recommends this mixture as a remedy for pterygium and opacities of the cornea. (*Dr Dymock Mat Med W Ind* 187) **U C Dutt** informs us that the ancient Hindus used the gum as an external astringent only.

THE SEEDS—Internally they are administered as an anthelmintic but regarding the reliance which can be put upon their action considerable difference of opinion prevails. Some medical men think that they can be advantageously substituted for Santonine while others view them as much less powerful. They have at the same time a warm purgative action which often proves injurious to their anthelmintic property. They are however largely used in the treatment of round worm. The following extract from **Dr Waring's Bazar Medicines** will be found to give the leading facts regarding these seeds. Butea seeds are thin flat oval or kidney shaped of a mahogany brown colour $1\frac{1}{2}$ to $1\frac{3}{4}$ inches in length almost devoid of taste and smell. European experience has confirmed the high opinion held by the Mohammedan doctors as to their power in expelling *Lumbrici* or *Round Worm* so common amongst the natives of India. The seeds should be first soaked in water and the testa or shell carefully removed the kernel should then be dried and reduced to powder. Of this the dose is 20 grains thrice daily for three successive days followed on the fourth day by a dose of castor oil. Under the use of this remedy thus administered in the practice of **Dr Oswald** 125 lumbrici in one instance and between 70 and 80 in another were expelled. It has the disadvantage of occasionally purging when its vermifuge properties are not apparent in some instances also it has been found to excite vomiting and to irritate the kidneys and though these ill effects do not ordinarily follow yet they indicate caution in its employment. (*Bazar Medicines Waring pp 31 32*) In the *Bhavaprakasa* the use of the seeds of the *Palasa* as an aperient and anthelmintic is noticed and they are directed to be beaten into a paste with honey for administration. **Sarangadhara** also recommends them as anthelmintic. (*Dr Dymock*)

Externally the seeds when pounded with lemon juice and applied to the skin act as a rubefacient. I have used them successfully for the cure of the form of herpes known as Dhobie's itch. (*Surgeon Major Dymock p 188*) When made into a paste they are used as a remedy for ringworm.

THE FLOWERS are astringent depurative diuretic and aphrodisiac as a poultice they are used to disperse swellings and promote diuresis and the menstrual flow. They are given to *eniente* women in cases of diarrhoea and are applied externally in orchitis.

THE LEAVES are described by the *Makhsan ul Adwiyas* as astringent tonic and aphrodisiac are used to disperse boils and pimples and are given internally in flatulent colic worms and piles.

MEDICINE
Gum
960

Juice
961

Seeds
962

MEDICINE
Flowers
963

Leaves.
964

**BUTEA
frondosa.****Bengal Kino****Bark
965**

THE BARK according to the *Hortus malabaricus* is given in conjunction with ginger in cases of snake bite

The gum and other parts of *Butea superba*, Roxb are also used medicinally by the natives being viewed as possessing the same properties as the corresponding parts of *B frondosa*

**Charcoal
966**

Special Opinions—§ The charcoal from this plant was introduced by Dr T W Sheppard in 1874 for bleaching the morphia manufactured at the Opium Factory Chazipur It was selected after a series of experiments with the different forms of charcoal its great advantage being its comparative freedom from saline matter it can on this account be employed without any previous purification Wood charcoal possesses feebler decolorising powers than animal but it had to be resorted to on account of the native prejudices against the use of bone charcoal (*Surgeon Warden Professor of Chemistry Calcutta Medical College*)

**MEDICINE
967**

I have tried the seeds of *B frondosa* internally in numerous cases and they are neither purgative nor febrifuge at least not in one drachm doses—the largest quantity I have yet used There is however no doubt that they are anthelmintic at least to some extent Administered in powder morning and evening for 2 or 3 days and followed by a dose of some purgative they generally expel from 1 to 3 or 4 round worms but failure is more frequent than success That these seeds are not powerful enough to act always against the worms is proved by the expulsion of the latter in large numbers in many cases by the use of santonine immediately after having failed with butea seeds Both the kernel and the testa of the seeds possess the anthelmintic property Dose of the powder for an adult from 30 grains to 1 drachm Four grains is an average dose for a child of 4 years

The inspissated juice of this plant (the butea kino of Indian commerce) is a good astringent and as such is useful in all the complaints in which the true kino is indicated It has been used in the same forms as those of the latter but in somewhat larger doses—viz from 15 to 40 grains (*Honorary Surgeon Moodeen Sheriff Khan Bahadur Madras*)

This is a fairly useful anthelmintic and a good substitute for santonine in some cases acting very well indeed **Preparations**—Powdered seeds dose fifteen to thirty grains twice or thrice a day followed by castor oil on the succeeding morning The gum has been only lately used in this hospital but as an astringent it is found to be a useful substitute for kino in the ordinary cases of diarrhoea and dysentery of children especially Preparations and doses &c are similar to kino (*Apothecary F G Ashworth Kumbalonn*) The leaves are astringent and used by the natives as a poultice to dispel tumorous hæmorrhoids buboes &c The seeds are anthelmintic in doses of 20 grains The gum is very astringent and in doses of five grains most useful in checking serious diarrhoea In large doses it is efficacious in hæmorrhage from the stomach and bladder A strong solution of the gum is said to be a useful application for bruises and erysipelous inflammations (*Surgeon R A Barker Doomka*) In common use as an anthelmintic dose for an adult 20 grains of powdered seeds (*Surgeon Mark Robinson Coorg*) Root of this tree is used as an aphrodisiac by native physicians (*Brigade Surgeon S M Shurcore Moorshedabad*) This remedy exhibits its anthelmintic properties to perfection when used in the following formula Powdered *Butea frondosa* gr 3 powdered ginger gr 1 santonine gr 1½ give for three successive nights and follow by a dose of castor oil on the fourth morning (*Honorary Surgeon Peter Anderson Guntur, Madras*) The seeds are used in urinary diseases In large doses the powder acts as a purgative also as an anthelmintic The flowers are used in the form of poultices in bladder diseases (*Surgeon W Barren Bhuj*)

| Butea Kino | BUTEA frondosa. |
|--|--|
| <p><i>Cutch</i>) Anthelmintic doses 5 to 20 grains used in round worm (<i>Choonna Lall Civil Hospital Assistant Jubbulpore</i>) Seeds are vermifuge dose powder 20 grains three times a day sometimes causes much vomiting and purging (<i>Apothecary Thomas Ward Madanapalli Cud dapa</i>) The powdered gum is a useful astringent in chronic diarrhœa pyrosis and dyspepsia The seeds are a powerful anthelmintic especially in the case of round worms (<i>Brigade Surgeon J H Thornton Mon ghyr</i>) Not nearly as efficacious as santonine (<i>Surgeon Major H J Hazlett Ootacamund Nilgiri Hills</i>) Anthelmintic The seeds are soaked in water the testa removed kernel dried and powdered dose grains 20 three times a day for three successive days followed by a dose of castor oil They act effectually in expelling large numbers of <i>Ascaris lumbricoides</i> (<i>Surgeon Major A F Dobson Bangalore</i>) The seeds are anthelmintic used to expel round worm in doses of 10 grs to 1 drachm of powder according to age (<i>Assistant Surgeon Shub Chunder Bhuttacharya Chanda ntial Provinces</i>) The juice I have seen used by natives in dysentery and ringworm (<i>Honorary Surgeon E A Morris Negapatam</i>)</p> | <p>MEDICINE</p> |
| <p>Fodder—The leaves are used as fodder for buffaloes and elephants The leaves are regarded as a valuable manure</p> | <p>FODDER 968 TIMBER 969</p> |
| <p>Structure of the Wood—Dirty white soft not durable no annual rings It is said to be better under water and so is used in North West India for well curbs and piles Weight 30 to 40 lbs per cubic foot</p> | |
| <p>It grows to a height of about fifteen feet and seldom lives more than ten years (<i>Bombay Gaz VII 40</i>) The wood is coarse and poor A seasoned cubic foot weighs 33 lbs (<i>Bombay Gaz XV Pt I p 64</i>)</p> | |
| SACRED USES | |
| <p>Sacred and Domestic Uses—From the name <i>palas</i> is said to be derived the name Plassey the scene of Clive's famous victory This beautiful tree is sacred to <i>Soma</i> (Moon) the wood is sacrificial and is frequently mentioned in the Vedas</p> | <p>SACRED 970</p> |
| <p>Dr Buchanan as a ready quoted says the flowers are offered to the gods and afford the yellow dye called <i>Vosonti</i> The <i>palas</i> is sometimes represented as a sacred tree of the Buddhists The word <i>palasa</i> in Sanskrit means leaf but it has become a modern equivalent for the <i>dhak</i> (<i>Butea frondosa</i>) a tree which is supposed to be imbued with the immortalising <i>Soma</i> the beverage of the gods Richard Folkard (in his <i>Plant Lore</i>) says This tree is supposed to have sprung from the feather of a falcon imbued with the <i>Soma</i> He adds The <i>palasa</i> was much employed by the Hindus in religious ceremonies particularly in one connected with the blessing of calves to ensure them proving good milkers The triple leaves were deemed to typify like the trident the forked lightning resembling the rod of Mercury the Sanic and the Rowan rod Speaking of these triple leaves Mr Lisboa says The leaves of this plant are trifoliate the middle leaflet is supposed to represent Vishnu the left Brahma and the right Shiv hence its worship is enjoined in <i>Chaturmas Mahatma</i> Hence also its use in the following three great ceremonies —</p> | <p>DOMESTIC 971</p> |
| <p>(1) The leaves are used as platters on the occasion of the investiture of the sacred thread when a particular part of the ceremony called <i>chewul</i> (that is when the barber removes the last tuft of hair from the head of the child to be invested) is being performed</p> | <p>SACRED USES Leaves as Platen. 972</p> |
| <p>(2) The dry twigs under the designation of <i>samidhas</i> are used for the feeding of <i>hom</i> or sacred fire in the ceremony which goes under the name of <i>nava grahas</i> celebrated to secure the pacification of the nine</p> | <p>Dry Twigs. 973</p> |

BUXUS

Box wood

Stem
974
Flowers
975
Dishes
976
Cups
977

planets (*nava*=nine *grahas*=planets) on the occasion of *vastu shanti* i.e. entrance into a newly built house or one acquired from a non Hindu

(3) The stem is used as a staff on the day of *sodmunj* a part of the thread ceremony (*Useful Plants of the Bombay Presidency* pp 279 80)

Dr U C Dutt says the beautiful flowers were used as ear ornaments by the ancient Hindu women and were much admired by the poets. The leaf dishes used at caste feasts are made by village Brahmans. Of two kinds—plates *patravalis* and cups *dadiyas*—the dishes are brought into Ahmedabad in bundles of 200 plates and 100 cups and are sold according to size the plates at from 3d to 6d (2 4 annas) the hundred and the cups at from 1½d to 2½d (1 1½ annas). Made of the dry leaves of the *khokhar* tree *Butea frondosa*, fastened together with small slips of birm boo they keep fit for use for two years. This industry is confined to the Daskroi villages near the city (Ahmedabad) where only they find a sale (*Bombay Gaz* IV 135)

978

Butea superba, Roxb Fl Br Ind II 195

Vern—*Lat palash* BENG *Baduri* SINGRAMPUR *Chihunt* MONGHYR *Nari murup* SANTAL *Palis pil s vela* BOMB *Vlkh kar* (UJ) *Bl palas* DUK *Yel paris palisavela* MAR *Kodi murukkam k di palis* ham TAM *Tige molku tige mltuga tige-palushama b ranki chettu ti va muduga* TEL *Balli mut taga* KAN *Valliplach cha valli murikka* MAL *Lata palisa* SANS *Samur* GOND *Tunang* KURKU *Pouknay pouknay* BURM

Habitat—An extensive climber scarcely differing from the preceding except in habit. Found in the forests of the Konkan the Central Provinces Central India Rajputana Bengal Orissa and Burma

Gum—It yields a gum like that of *B frondosa*

Dye—The root is said to yield a red dye in Burma. A sample of red dye wood appears to be the root of *Butea superba* a well known creeper whose scarlet blossoms are a conspicuous feature of the forest landscape in February and March (*Indian Forester* Vol X p 75). The information regarding this dye is exceedingly meagre it is remarkable that no mention is made of the roots of the preceding species as affording a dye

Fibre—An extensive climber scarcely differing from *B frondosa* except in habit. The roots as also the young branches afford a strong and useful fibre prepared in Chutia Nagpur the Central Provinces Central India and Rajputana

Fodder—The leaves are regarded as a valuable fodder

GUM
979
DYE
980

FIBRE
981

FODDER
982
983

Butter

Vern—*Navania* SANS *Mkhan* HIND BENG GUJ *Maska loni* MAR

The fatty portion of the milk of all mammalian animals is called Butter but the term in a commercial sense is restricted to that from the cow (*Spons Encyclop*). In India butter is made from cow or buffalo milk it is chiefly used in the form of *ghu* or clarified butter (See *Ghu*)

984

BUXUS, Linn Gen Pl III, 266

Evergreen shrub or undershrubs with 4 sided branchlets and opposite exstipulate leaves. Flowers monœcious in axillary clusters. Calyx of male flower deeply 4 cleft the segments opposite in pairs of female flower deeply 6 cleft the segments in two circles of three each. Stamens 4 opposite the calyx segment inserted around a 4 sided rudimentary ovary. Ovary 3 celled 3 cornered with a flat top the corners terminating in thick short styles which alternate with the 3 inner calyx segments. Capsule coriaceous loculicidally 3 valved each valve ending in 2 horns being the valves of 2 of the styles dissepiments attached to the valves. Seeds 3-6 trigonous

B 984

Box wood

BUXUS
sempervirens**Buxus sempervirens, Linn Brandis For Fl, 447 Camble's Man***Limb 369 EUPHORBACEÆ*THE BOXWOOD TREE *Eng* BUCHSBAUM *Germ* BUIS, *Fr*, Bosso, *It***Syn**—B WALLICHIANA *Baillon***Vern**—*Shanda laghune* *AfG* Chikri KASHMIR *Papri papa papur*
paprang shamshad shumaj *PB***Habitat**—An evergreen shrub or small tree met with in the Suliman and Salt Ranges North West Himálaya between 4 000 and 8 000 feet in Bhutan about 6 000 to 7 000 feet but scattered in different parts of the Himálaya chiefly on a calcareous soil and often in remote localitiesThe tree is however constant in one respect as regards its habitat and thrives in moist and sheltered places hugging the alluvial deposits along the banks of the perennial streams and it does not thrive where it is exposed to winds whether hot and dry or cold and frosty It also avoids the hot sides of the valley and evidently prefers a north west and northerly aspect (*R part on the Boxwood supply in the Panjab by Mr Ribbentrop Indian Forester XI 26*)**Medicine**—The wood is diaphoretic leave bitter purgative and diaphoretic useful in rheumatism and syphilis A tincture from the bark is used as a febrifuge**Fodder**—**Stewart** says that goats will occasionally browse on the leaves but other animals will not do so unless in times of dearth They have been known to prove fatal to camels and cattleThe leaves are used in the outh of France as manure for vine yards (*Gamble*)**Structure of the Wood**—Yellowish white hard smooth very close and even grained Annual rings distinctly marked by a narrow line without pores Weight 55 to 65 lbs per cubic foot The rate of growth is variable generally slowThe following extract from **Mr Gamble's Manual of Indian Timbers** will be found useful It is estimated that the cost per cubic foot of boxwood delivered at Saharanpur from the Kelso forest would be **Rs 18** its further cost by rail from Saharanpur to Bombay would be at least **Rs 18** or total **Rs 36** per cubic foot Considering 1 cubic foot as weighing 60 lb we have the cost per ton as **Rs 112** which could only be just covered by receipts if the very best description of wood were sent down There is consequently little likelihood of much trade in boxwood from the Himalayan forests

The uses of boxwood are well known In Europe it is used for engraving turning carving and mathematical instruments In the Himálaya small boxes to contain butter honey tinder snuff &c are made of it and it is carved into combs The boxwood to be used for engraving requires very careful and lengthened seasoning On this subject and on the other requisite characters of boxwood for commercial purposes the following extract from a letter of Messrs J Gardner and Sons of Iiverpool to the Inspector General of Forests dated April 3rd 1877 will give information —

The value of boxwood at Bombay of suitable texture for the English market of which latter we can judge from a few sample pieces will depend principally upon the quality

Wood from 2 to 4 inches diameter is required to be free from splits or cracks otherwise however free from knots and straight and round it may be the value would not exceed **£1** to **£6** per ton whilst if free from split round and straight and without exceeding one knot per foot in length the value would probably be **£10** per ton exceeding 1 knot and not exceeding 2 knots } **£7** 10s
2 knots } **£5**
3 knots }

—all knots or holes counted as such however small

985

MEDICINE
986FODDER
987TIMBER
988Fancy Boxes
989
Engraving
slabs
990

B 990

**BUXUS
sempervirens****Boxwood****TIMBER**

Wood 4 inches and upwards in diameter is preferred with one split rather than sound or with more than one split any splits after the first reducing the value on account of the additional waste in working the same

| | | Average per foot in length | | |
|---|------------------------------|----------------------------|---------|---------|
| | | 1 knot | 2 knots | 3 knots |
| The value of round and straight (1 split) averaging | 4 to 5 inches diameter | £ 6 | £ 4 10s | £ 3 |
| | 5 to 6 | 9 | 6 | 3 |
| | 6 inches and upward diameter | 12 | 9 | 4 10s |

If the splits are twisted more than 1 inch to the foot if small 2 inches if medium size and 3 inches to the foot length if large the value is reduced one half

The above values will of course vary in accordance with the supply and demand for the various sizes and qualities

The most suitable texture of wood will be found growing upon the sides of mountains If grown in the plains the growth is usually too quick and consequently the grain is too coarse the wood of best texture being of slow growth and very fine in the grain

It should be cut down in the winter and if possible stored at once in airy wooden sheds well protected from sun and rain and not to have too much air through the sides of the shed more especially for the wood under 4 inches diameter

The boxwood also must not be piled upon the ground but be well skidded under so as to be kept quite free from the effects of any damp from the soil

After the trees are cut down the longer they are left exposed the more danger is there afterwards of the wood splitting more than is absolutely necessary during the necessary seasoning before shipment to this country

If shipped green there is great danger of the wood sweating and becoming mildewed during transit which causes the wood afterwards to dry light and of a defective colour and in fact rendering it of little value for commercial purposes

There is no occasion to strip the bark off or to put cowdung or anything else upon the ends of the pieces to prevent their splitting

Boxwood is the nearest approach to ivory of any wood known and will therefore probably gradually increase in value as it as well as ivory becomes scarcer It is now used very considerably in manufacturing concerns but on account of its gradual advance in price during the past few years cheaper woods are in some instances being substituted

Small wood under 4 inches is used principally by flax spinners for rollers and by turners for various purposes rollers for rink skates &c &c and if free from splits is of equal value with the larger wood It is imported here as small as 1½ inches in diameter but the most useful sizes are from 2½ to 3½ inches and would therefore we suppose be from 15 to 30 or 40 years in growing whilst larger wood would require 50 years and upwards at least — perhaps we ought to say 100 years and upwards It is used principally for shuttles for weaving silk linen and cotton and also for rule making and wood engraving *Punch The Illustrated London News The Graphic* and all the first class pictorial papers use large quantities of boxwood

Messrs Churchill and Sim reporting on some boxwood sent to them for sale in 1880 and which fetched 21 shillings per cwt equivalent at 60lb per cubic foot to 11s 1d or about £6 per cubic foot say —

The pieces of boxwood were remarkably fine specimens equal in quality to the best Abasia and fetched a very high price equivalent to £21 per ton These logs were depreciated in value for ordinary purposes owing to their having been squared which was a mistake as in that operation much valuable wood had been wasted and when the bark is removed a good protection to the log is destroyed In the present state of the boxwood trade and considering the fact that the supplies which have been coming forward for some time past are deteriorating in quality from the action of the Turkish Government in closing the forests and from other causes the probability of a supply of this wood from India is a matter of considerable importance The usual run of this wood would not however fetch the high price of this picked sample The price realised cannot however be taken as any criterion for whether supplies can be sent to this market and sold at prices which will cover transit and freight and then leave a profit is very doubtful Could this wood be regularly placed on the market at a moderate figure there is no reason why a trade should not be developed in it

Regarding the consignment of boxwood made to Messrs Gardner

Boxwood

BUXUS
sempervirens.

and Sons the following extract from the Kew Report 1881 will be found interesting —

Messrs Joseph Gardner and Sons the well known timber merchants wrote to **Dr Brandis** the Inspector General of Forests in India April 29th 1881 on the subject We bought the parcel (about 5 tons) landed ex *Strathmore* in London at the high price of £30 per ton At these high prices the consumption will be very limited indeed Can you kindly inform us what the prospects are of securing any large quantities of this wood say 5 000 to 10 000 tons at about £10 per ton in Liver pool or London? We are drawing our present supplies from Russia and Persia principally but there are so many fiscal restrictions and the wood is also inferior to your Indian shipments that we should prefer drawing all our supplies from India At any thing like £30 per ton only very small quantities can be used at £10 however it would probably be used very extensively for various purposes for which cheaper woods than boxwood are now used

To this communication **Dr Brandis** replied July 6 —

The boxwood resources of the country are very limited There is no chance of such large supplies as from 5 000 to 10 000 tons being available from India (p 25)

Mr Ribbentrop in *The Indian Forester* reports on the Panjab Box wood as follows —

The cost in carriage between Saharunpur and Umballa is Rs 1-9 per maund deducting this from the above I find that boxwood from Bashahr could be landed in London at Rs 1-4 + Rs 1-32 (carriage to Umballa) = Rs 24 per ton Taking the exchange at 1s 7½d this is an expense of £18 8s 8d per ton for the boxwood consigned to London

The price quoted at home is £24 per ton weight

It will thus be seen that by exporting the first class wood we will realise it is estimated a net profit of Rs 75 per ton or Rs 35 above the price which it would fetch in the local market

The net value of the Bushahr box forests which are the only ones that need be taken into consideration as regards immediate exploitation is therefore—

| | R |
|--------------------------|----------|
| 700 tons at Rs 75 profit | = 52 500 |
| 300 tons 25 profit | = 7 500 |

I roughly estimate that with strict protection and the gradual thinning out of dominant trees of other kinds the present growing stock will replace the mature stock in 24 years in which time the present mature timber may be extracted reproduction being ensured at the same time (*Indian Forester* XI 28)

A good deal has been written regarding this subject and a few interesting papers have appeared upon the possible future Indian trade in this most valuable timber It is very much to be feared however that both on account of the limited amount of boxwood and the heavy transport charges India cannot to any very great extent become a source of supply to Europe It will only pay to export selected pieces and there will not appear to be any local demand for second class boxwood This seems to be the conclusion arrived at both in Europe and in India and accordingly in the Kew Report already quoted we find the subject of boxwood substitutes urged as more worthy of attention It is evident therefore that we cannot look to India to remedy the increasing dearth of boxwood It would be obviously much to the advantage of any of our colonies that could send into the timber trade in quantity any wood which would be acceptable as a boxwood substitute For a list of probable woods of this nature see BOXWOOD SUBSTITUTES page 518

